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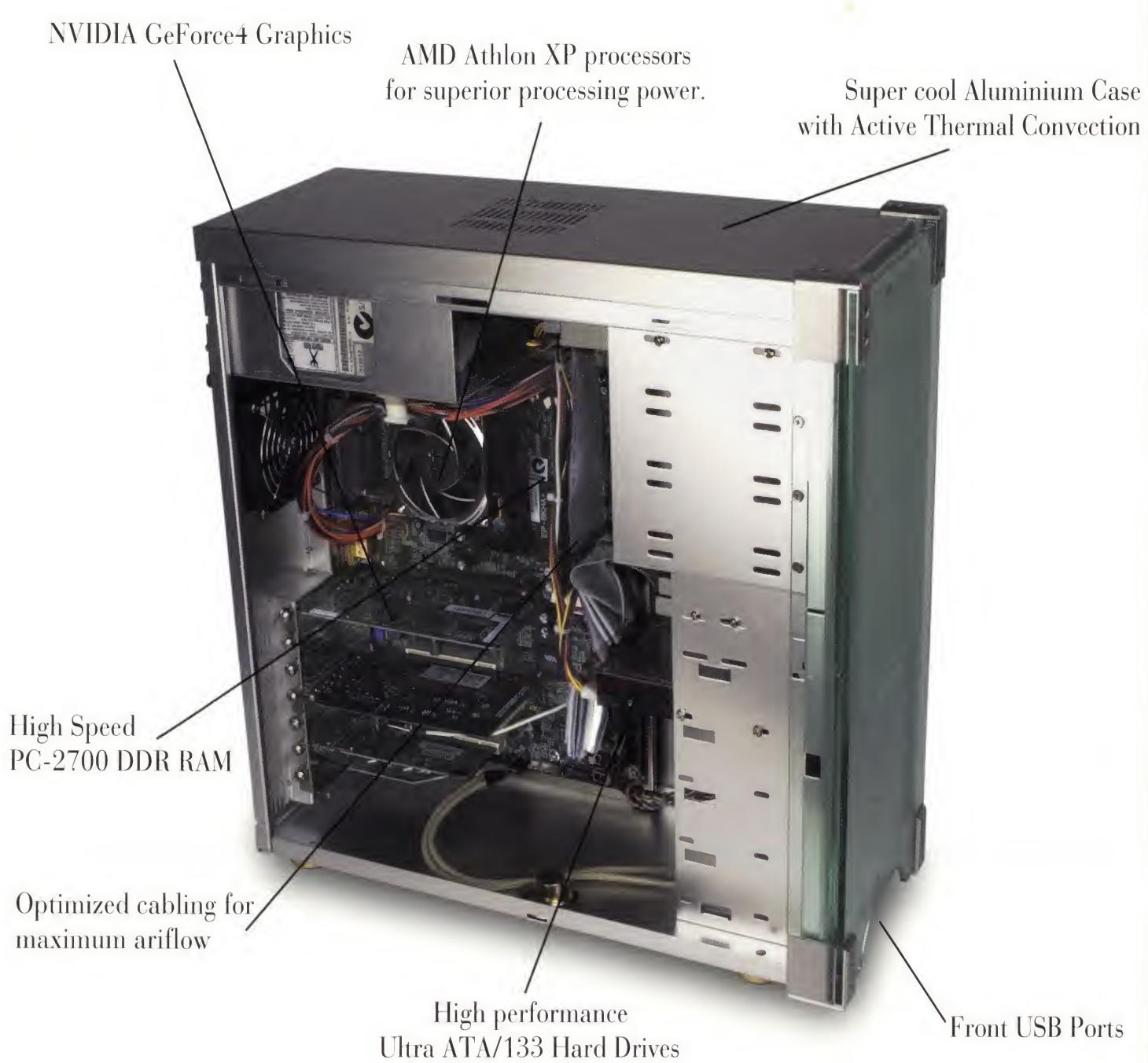
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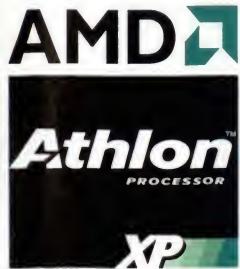
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Our wonder box

The *Atomic Heavy Water Project* comes to an end this issue. Over four intense months Ron Prouse has been building our ultimate PC, and like you, we've been following his tutorials closely. Each step of the way Ron has amazed us with his ingenuity, attention to detail, perfectionism and burning desire to create the most kick-arse Hot Box ever. I've received many emails from Atomicans following the project to varying degrees. Can't wait to see the pics of what you guys build!

Ron lives in Adelaide, so, like you, we've had to make do with pics only. Yesterday though, Heavy Water arrived at *Atomic HQ*. OMFG. We were stunned. Honestly, pictures alone do not do this justice. The entire company crowded around. Hardened, jaded IT pros that had seen it all could not believe their eyes. Ron, I congratulate you, I am proud to say that the *Atomic* box you've built for us is the most beautiful machine I've ever set eyes upon.

It's going to pain us to give it away as much as it would have pained Ron to part with it. Whichever Atomican wins it

will be a very special and lucky person indeed. We know they will appreciate being in possession of the hottest box ever, and we hope that they let others see it. It's too good to live on a desk, this baby needs to get out, to LAN, to be admired by many. The last of the four competition questions is in this issue. Don't miss your chance, because this thing is just amazing.

Many thanks to the companies that provided the parts, they're listed at the end of the *Heavy Water Project* and we are most grateful. We asked for only the very best components and they happily provided them. This machine will rock hard. Athlon 2100, 3 x 80GB RAID Seagates and an Abit GeForce4 Ti4600, water cooled, in the most beautifully engineered box ever. Yes. Oh yes. Very very *Atomic*.

Ben Mansill

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Eizo monitors used on cover kindly supplied by Anitech (1800 70 50 60)



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Short Circuits

► Philips recently demonstrated the world's first optical drive based on Blue Laser technology. At only 3cm in diameter and capable of storing up to 1GB of data per disc, Blue Laser technology has huge potential in areas ranging from PDA and phones through to mobile computing and portable storage.

► If you've decided to overclock your low-end Northwood P4, it might be wise to limit the extra voltage you use attempting to reach Warp Speed 9.

Reports are starting to spring up that the 0.13 micron manufacturing process used by these CPUs doesn't like to play at voltages above 1.7V for extended periods of time, even when using extreme methods of cooling. Terminal failure appears to be the end result, so until we know for sure if the chips can handle higher voltages, stick to 1.7V or less.

► The JPEG file format is in danger of losing its International Organisation for Standardisation accreditation after US company Forgent Networks announced it intended to claim licensing fees for international patents it holds on the JPEG algorithm.

Forgent plans to solicit licensing fees from a number of different parties including digital camera manufacturers, printer manufacturers and scanner manufacturers.

While many believe Forgent's claims are without foundation, at least one company so far is rumoured to have paid Forgent a US\$15 million licensing fee.

Regardless of whether Forgent's patent applies, most organisations approached by the company will likely stall for time. If they're lucky, they'll reach the 2004 expiry date for the patent in question before being forced to cough up bucket loads of cash.

Green with NV



NVIDIA's reign as the king of graphics is finally over. Since the launch of the original GeForce 256, NVIDIA has always been on top, despite being occasionally shaken on the technology side by ATI's RADEON series, because with every new launch by ATI, NVIDIA would release its Detonator drivers, and reclaim the performance crown. This fateful July, ATI's much anticipated R300 was unveiled to the world.

The RADEON 9700 is fully DirectX 9 compliant, boasting eight pixel pipelines clocked at over 300MHz and fed with 20.8GB of raw memory bandwidth. Technologically, the RADEON 9700 is so advanced ATI is dubbing it a 'VPU'

(Visual Processing Unit), a name invented by 3dlabs for its P10 processor. The new RADEON will support 128-bit floating-point colour precision, something that ought to make John Carmack a little too giddy. The number of vertex units has quadrupled to four, and displacement mapping is also incorporated into the TRUFORM II engine.

The most impressive feat of this new chip is definitely its speed. Designed like a CPU and using the FC-BGA form factor, ATI engineers managed to push the core to over 300MHz, and as it already packs 110 million transistors and uses the not-so-cool 0.15-micron process, this is a non-trivial feat. In benchmarks so

far, the RADEON 9700 has pushed the Ti4600 into the less-than-glamorous second place — even in NVIDIA's own benchmarks!

The question on everyone's lips right now is how the NV30 will turn out. As we've previously reported, while ATI has been churning out new architectures every year or so, NVIDIA has been milking the NV20 architecture for almost two years. While the performance gains certainly warrant such development, producing two refreshes (GeForce3 Ti, Geforce4 Ti) out of the original NV20 has allowed ATI to catch up not only on the technology front but now also on performance. The NV30 architecture will be the first 'ground up' chip from NVIDIA since the conception of the RIVA128. It will also have had the benefit of being influenced by 3dfx engineers and their cache of patents and technology. Very little is known, except that it has been proclaimed: 'The greatest contribution to 3D since the founding of the company', by NVIDIA's CEO Jen-Hsun Huang. It has been well publicised that NVIDIA plans to concentrate on pixel quality and programmability for its new chip. □

Modulicious

The free world was made just that little bit freer late last month when the Australian Federal Court ruled PlayStation modchips legal. The justification behind the ruling was that regioning methods — such as those used to prevent Australian PlayStation owners from playing overseas PlayStation games — restrict the rights of gamers. The Court was of the opinion that if you purchase a PlayStation game while on holiday in Japan, you should be able to run said game on

your Australian console.

Australian Competition and Consumer Commission chairman Allen Fells heralded the ruling as a victory for Australian consumers, stating: 'Australian consumers can now enjoy games legitimately bought overseas, as well as authorised back-up copies, by legally having their games consoles chipped'.

It should be noted the Court considered only modchips' ability to play overseas and 'backup' copies of games. The issue of piracy,

which has always been Sony's major complaint against mod hardware, was a peripheral issue. While the ruling applies to the PlayStation console specifically, reasoning behind the decision suggests that all forms of zoning and regioning systems — such as those used on DVDs — may fall under the same umbrella. Which means, hopefully, we could see all console modchips officially legalised. Who knows, perhaps the courts will get rid of the annoying DVD zoning 'feature' while they're at it. □

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Mouse



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Short Circuits

1 NVIDIA recently announced the latest in its nForce line of motherboards, creatively named nForce 2. Main features of the new board include integrated GeForce4 MX graphics, DualDDR 400MHz RAM, support for AGP 8x, IEEE-1394, DualNet Ethernet, USB 2.0 and Dolby Digital 5.1 Surround.

While we don't expect to see nForce2-based motherboards before September this year, members of the Taiwanese branch of our Atomic Spy Ring report rumours of bugs with the chipset that are yet to be resolved. If these bugs prove serious they could potentially push any release date back to some point next year.

► Ogg Vorbis, an open 'patent and royalty free' audio compression codec, has finally made it to version 1.0 after many years of development. Why is this important? Because Ogg is both 'free as in beer' and 'free as in speech', unlike the MP3 codec for which the Fraunhofer Institute holds several patents. Along with its version 1.0 milestone, Ogg Vorbis had another win recently when Real Media announced it would incorporate Ogg support into Real Player.

► Owners of Windows 98SE or Windows NT4 should be less than pleased with the news that Microsoft has officially ceased driver support for these operating systems. According to a Microsoft statement, 'WHQL will no longer accept submissions for all hardware devices and systems for... Windows 98SE [and] Windows NT4'. Meaning drivers for new hardware will only be WHQL certified for Windows ME, 2000 and XP platforms.

Still, this isn't an insurmountable problem considering 99% of the gaming population prefers to use the latest, non-WHQL drivers.

Packets from above



There's something inherently wrong with having your local Wireless Access Point fly silently overhead at 18km altitude. Sure you'd have great network reception, but what happens when something goes wrong? Imagine: instead of calling your sys-admin when the network goes down and you can't receive email, someone screams 'The network's crashing!' and you all duck and cover, ready to kiss your arses goodbye if the AP happens to select your building as the recipient of a 'personal' network outage. Still, the advantages of having a mobile, cheap, sky-high Wireless Access Point are many and that's why US company SkyTower Communications is bringing the concept to market, in the form of a modified Helios solar powered aircraft. SkyTower, in conjunction with NASA and the Japanese Telecommunications Ministry, has successfully trialled transmission of 3G and HDTV content via Helios on its maiden test flight, at an altitude of 18km above Hawaii.

The aircraft is capable of providing Internet access, 3G

content, HDTV transmission and PSTN service from the stratosphere and is essentially geostationary from our POV.

AeroVironment, SkyTower's parent company, says the final product will provide coverage to areas ranging from roughly 60-600km. It will also provide a theoretical bandwidth of up to 50Mb/s per user, eliminate LOS issues plaguing current Wireless access systems, and do it at a cost comparable to (and in some cases, less than) that of current solutions.

Currently, SkyTower is limited to daytime operations due to its reliance on solar power. However, engineers are working on a reliable method of storing surplus power gathered during daylight hours to give the craft 24-hour operational ability. If it succeeds, it will give SkyTower a theoretical six months of flight time between landings for maintenance. AeroVironment says a commercial service based on SkyTower could be brought to market as early as 2005. For more information, see www.skytowersglobal.com/begin.html

Atomican

Isn't time a funny thing? Without it, we'd never get anything done and life's great moments couldn't be measured. Birthdays, dates, late nights, and Christmas would be stricken from our vocabulary of fun. On the plus side, we could never be charged for how long we've been connected to the Internet. But if time didn't pass, meatbites fantasmorific Atomican's Eon Statistics Board (AESB www.atomicmpc.com.au/forum.asp?cat=ge&top=22063) wouldn't have been born, and wouldn't show just what a wide range of ages our magazine draws in. All the way from Oracle to Kelsie, it quenches our thirst for facts and figures. Kudos to you meatbites!

The more nocturnal of the Atomic species would also lose part of their classification. (www.atomicmpc.com.au/forum.asp?cat=ge&top=56554). No longer would the domain of AM be theirs to rule with an iron fist. They'd simply be referred to as 'those guys who have inverted sleep patterns to the rest of society'. The 'wee hours' would be replaced with 'when it's dark', and remove their I337ness.

Unfortunately, we can't overclock time or put a case window in the space-time continuum until somebody starts handing out flux capacitors and time flying Delorians (www.bttf.com), so we will just have to put up with boring beige time for the moment.

Therefore remember folks, you can fool some of the people all of the time, and all of the people some of the time, but you can not fool all of the people all of the time, and if there is no time, then... umm... does that make you a fool?

WHAT'S HOT

- RADEON 9700 – ATI gets serious
- AMERICA'S ARMY – US Army freebies rock
- MOUNT RAINIER – Burn baby burn
- OZZY OSBOURNE – Modern musical legend
- DIALUP – Looking better ever day

WHAT'S NOT

- NVIDIA NV30 – Can anyone say 'slipping'?
- THE KISS ARMY – Crappy assortment of weapons
- MOUNT EREBUS – So not hot its frozen
- KELLY OSBOURNE – Argument against heredity
- OPTUS CABLE – The party is over

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10:33 Burned

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- 4 x ATA133 (RAID ATA133 is optional)
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- ASUS POST Reporter[®], ASUS MyLogo[®]
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Honouring privacy

The biggest threat to our privacy isn't a gun-toting terrorist army, says

Ashton Mills, it's that shiny stuff that goes by the name of 'money'.



Our society has always had a battle, by differing degrees, between individual freedoms and the power to control. Like yin and yang they balance each other, one defined by the other.

The Internet has sparked new levels of freedom, itself borne out of a mish-mash of come-as-you-are acceptance and the free sharing of ideas.

Then, with its popularity setting off the moolah radars of lawyers, marketers and fat suited men everywhere, the corporates moved in. And we started seeing spam, pop-ups and spyware appear everywhere, and emailing lists being sold to the highest bidder.

We were also given something else in abundance: paranoia.

'Microsoft's executives have got it into their heads that people cannot be trusted. We are all, clearly, criminals. . .'

Parasitic structures such as the MPAA and RIAA moved in to claim a slice, by force, of a market they didn't understand. The US, after September 11, went crazy amending laws to try and counteract such a terrible thing happening again, and partly focused its attention on the Internet and the flow of information. The all new Patriot Act gives Government institutions such as the FBI extended powers to do things like spy on Internet usage, collect personal details from ISPs, and search homes or offices, all without first going through the courts.

And then the Government wonders why freethinking people want crypto so much! Tight restrictions have been imposed on cryptography products – exporting high-level crypto technology from the US is illegal, lest it be used against it.

Then there's Microsoft's Palladium. I might as well add my enlightening dissertation to the thousands of others online: you can shove it where the sun don't shine. Protection for the consumer? Or, rather, protection for massive content providers such as Hollywood, and software giants whose name starts with a capital 'M'?

Somewhere along the line Microsoft's executives have, like their counterparts at the MPAA and RIAA before them, got it into their heads that people cannot be trusted. We are all, clearly, criminals who need to have our usage habits controlled. And oh, the irony – this assumption of our guilt from a company found guilty of criminal activity!

Quips aside, it is, as always, about the bottom line. Hollywood is pushing for control at the hardware level, and Microsoft is all too ready to give it. Microsoft will benefit twofold: through selling the technology, and through being the one who controls it.

In the digital age where information is currency, it only stands to reason that

sooner or later there will be those who come and try to control the flow – because that's where the real power lies. This is why Microsoft is entering the hardware biz in the form of Palladium, why it pushes Passport from the moment XP is installed, and why it gave IE away from the beginning.

If Microsoft is at the start, the middle, and the end of all your information transactions, then as gatekeeper it will wield tremendous power over the content and future of the Web, and thus its users.

Speaking of control, let's not forget Carnivore, which is now no longer a secret. If you're starting to get an idea of just how many different parties are out to tap or control the flow of information, then you'll understand why organisations like the Electronic Frontier Foundation exist, and why they fight to stop or amend laws like the DMCA and the Patriot Act.

If we didn't have the EFF and similar organisations fighting for us, the situation might be a lot worse right now.

Thankfully, there are those not motivated by the colour of money or the dazzle of power. They recognise that

people, generally, like to own their personal information and that the right to privacy is as inalienable as the freedom to breathe air. Out in RealLife it's easier to keep tabs on the state of privacy and who is doing what by following whatever policies and corporate sponsored laws the Government is trying to pass. But online, in no man's land, it's nigh impossible to know you're being monitored, where from and by whom.

Which is why there are any number of encryption tools available for users of the Internet.

At almost every level of communication you have the option of protecting your information from prying eyes. Any email client worth its bits will support encryption, either internally or using third party tools such as PGP (Pretty Good Privacy). Telnet, long acknowledged as being insecure, has been replaced by the encrypted streams of SSH (Secure Shell) for quite some time now. And if you need to browse the Web anonymously, where your identity can't be tracked back, there are quite a few anonymisers at your disposal such as www.anonymizer.com. Even instant messenger clients like Trillian feature built-in encrypted sessions.

Your privacy isn't always an issue of national or global scale either. It's not uncommon for large businesses to monitor the email and instant messaging sessions of its staff – there is software designed specially for this task, looking for keywords in email and messages and alerting the powers that be.

So in this age of digital communication, keep in mind that the bits you send and receive at work or at home aren't necessarily just going to be read by you and your recipient. If it's personal, use encryption. And keep in mind that a Palladium future will be likely unless people rally against it and support organizations like the EFF, so if you're interested do what you can to help.

Keep your bits private

- Good selection of privacy software www.epic.org/privacy/tools.html
- Top 12 ways to protect your privacy, by the EFF www.eff.org/Privacy/eff_privacy_top_12.html □



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Hit prediction

Tim Dean gazes into his magic crystal ball and gets speculative about the future of computing.

We have a bit of a pool running in the office, and not of the bikinis and pina colada variety. This is hard-edged gambling at its best.

It all began with Team Fortress 2. I first heard of TF2 back when Half-Life was released. It was Christmas 1998, and TF2 was supposed to be this amazing free add-on that Valve was developing for Half-Life, and was going to be released a few months later. Cool.

Instead, we got Team Fortress Classic. Sure it was free. Sure it had classes. Sure it kept me busy for a few months, but it just didn't roast my onions in that full-body, sensory-deprivation, total-consciousness way. Then we got Counter-Strike. Now, for

still tapping away on their typewriters, banging out code.

By the end of 2000, however, especially given the attention being heaped upon Counter-Strike, my faith began to wane. As such, Hit Prediction #1 was announced, and the office pool was born.

I said it then, and I'll stick to it now: Team Fortress 2 will never be released. Never. Want to make a bet?

Sure, Valve might well release Counter-Strike 2, and it might well be basically what TF2 was going to be, but it won't be Team Fortress 2. \$50 was laid down, and while I'm not entirely sure how either myself or the rest of the *Atomic* crew will ever collect, the

'Bitboys quite simply doesn't exist. And as Bitboys doesn't actually exist, there's no bloody chance of there ever being a product released.'

about a year, at least, CS *did* float my boat. But then I got to thinking again – about TF2. By this stage it was in the middle of the heady time we call 'early 2000'. Bardot was rocking the Kazbah with killer tracks like *Poison*; the Nissan 200SX was wowing drivers with its Performance Car Of The Year-winning zoom; Denise Allen swung the Benalla District to the ALP in the May by-election; a major trough crossed eastern Australia with strong cyclogenesis near Tasmania, resulting in blackouts due to strong winds and lightning in the north of the state late in May; and the prospect of beer prices rising up to 9% with the GST struck fear and uncertainty into the heart of Australians nation wide.

While all this was going on, I was beginning to wonder whatever had happened to TF2? Wasn't it supposed to be out, like, a year ago? Didn't it win Best Action Game of E3 in 1999? So, where was it?

Alas, the dribbles of screenshots and tech previews floating around the Net was enough to restore my confidence that at least a half dozen monkeys were

pool is still running. And, kind of by default, I consider myself to be in the lead. Things didn't stop there though. Another company, that had been bugging me with promises undelivered, had sparked that deep, deep well of cynicism that lurks just below the surface and encouraged me to start another pool in October 2001. Thus, we have Hit Prediction #2:

Bitboys is nothing but vapourware.

In fact, the full version goes something like this: Bitboys quite simply doesn't exist. Never has, never will. And as Bitboys doesn't actually exist, there's no bloody chance of there ever being a product released by it.

I don't know if you've ever seen the film of *Clear and Present Danger*, where the villain dude, Col. Felix Cortez, has a setup with a girl sitting in a flat next to a phone and a tape recorder that plays sound of a factory floor. Whenever a call comes into his fake company, she plays the tape and answers like a secretary, duping the caller into thinking the company is buzzing with activity. Now, in my mind, that's *so* Bitboys. And with a bit of

Photoshop work, that company releases a 'photo' of 'pre-production' silicon every now and then. The office pool was then made concrete with the words: 'If Bitboys comes out with a complete product that beats the current NVIDIA competitor in Q3:A and 3DMark2001 (or more current benchmarks) then Zuel (that's me) owes GRIMEY (that's John) \$10. If it doesn't, then GRIMEY owes Zuel \$10. If the Bitboys product beats NVIDIA in price/performance then Gunnie (that's Bennett) owes GRIMEY \$50. If not, GRIMEY owes Gunnie \$50.'

The deadline for this bet is 1 October 2002. And, once again, I'm feeling pretty good about this one. We'll keep you up to date with the pool, and on the first day of October, we'll jump on the forums and let you know the outcome (although you'll probably be able to guess by then).

Now, to keep you busy for a while, here are a few more new predictions:

Doom 3 will flop (it'll sell less than any of the Quake series or Wolfenstein, at least); AMD will start using RDRAM (or at least not parallel SD-based RAM) as standard sometime before 2004; Apple will stop selling desktop PCs by mid-2004 – or, Apple will release a version of OS X for IA32, maybe IA64, by mid-2003; we'll discover the traces of life on an extra-solar planet by spectroscopy by 2025; the United Nations will dissolve and the US will run a kind of global political protection racket among western nations by 2040; we'll conclude that Quantum is incomplete as a theory, and another lower-level theory will be proposed by 2050 to fill in the gaps, resulting in the universe being considered deterministic again; humans will create the first fully-independent self-replicating robots, and will war with them for control of Earth's resources by 2150.

Obviously, the predictions further on in the future are slightly more speculative, but hey, I'm sticking to them anyway. If you want to comment on any of these, or offer your own, jump into the forums at www.atomicmpc.com.au, and let the flames begin.



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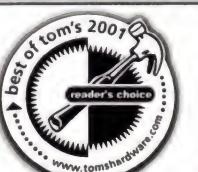
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Not so super

NVIDIA does an Apple and wrongfully claims 'supercomputer' status.

Luckily Dan Rutter is at hand to set them straight.



Go and have a look at www.nvidia.com/view.asp?PAGE=xbox. That page has been up for a while now, so I'm guessing that it'll still be up when you read this.

On that page, NVIDIA asserts that the Microsoft Xbox (whose biggest and baddest chip is an NVIDIA product, hence the puffery on its site) '...has 80 gigaflops of computing power. That's equivalent to the power found in a Cray C94 supercomputer.'

This bold statement is – to use a technical expression – 'a big fat pile of marketing'. As in, 'Look out! Don't step in the marketing!'

By the same logic used above, one could argue that the 255 kilowatt engine

Assume you've got a PC with a CPU so blindingly fast that, even though it's a general processor and not a dedicated graphics device, it can render 3D video as well as the Xbox video chip can.

That CPU still isn't within a thousand miles of a supercomputer with similar processor grunt.

One of the basic features of the tasks performed by traditional supercomputers (as opposed to distributed 'cluster' supercomputers made of many relatively independent nodes), is that most of the input data to the supercomputer's CPUs (there's usually more than one processor), and most of their output, is going to and from main memory at astounding speed.

All the time. Non-stop.

has cache as well. The whole graphics card memory block can be regarded as a slow, but huge, cache.

3D games are not at all like supercomputer tasks. Games tend to chew on the same data over and over, without leaning on main memory all the time. Which is why PCs can get away with video cards that have a slab of on-board RAM and a relatively small pipe back to main memory, and with CPUs that have a (smaller) slab of cache, and only slightly less weedy main memory access speed than the graphics card.

The twin-processor Cray C94, for genuine supercomputer tasks, is generally rated at two Gigaflops, not 80.

It can probably do 80 or more Gigaflops for goofy little benchmarks, but nobody cares about them.

They're worse than trying to determine an Abrams M1A2 Main Battle Tank's top speed by jacking it up off the ground and seeing how fast it can spin its tracks.

In the future, it's possible that marketing bulldust about graphics hardware power will be slightly less meaningless, because we'll soon have more generally programmable graphics chips, with the ability to do things like arbitrary floating point operations.

This may, just *may*, actually also mean that the special new hardware features of these video cards will actually be used by game writers, in exactly the way that hardware Transform and Lighting, and programmable vertex and pixel shaders, generally haven't been.

Heck, we may even actually see distributed computing clients that can run on 3D hardware when you're not using it, allowing you to make your SETI@Home or Folding@Home or distributed.net scores more studly. Such things have been announced before, but they've all been hoaxes; they might now become real.

But. Nonetheless. For one giant serialised calculation, a standalone non-clustered single-processor supercomputer, which is, for dumb benchmark tests, apparently slower than a consumer PC, will trample the PC into the dirt and urinate on it.

That's another technical expression, by the way.

'3D games are not like supercomputer tasks. Games chew on the same data over and over, without leaning on main memory all the time.'

in a Holden Special Vehicles Series 2 ClubSport clearly makes it 14% more capable than a 224 kilowatt Panzerkampfwagen IV.

A brief examination of these two machines should persuade even the very unobservant that a 2002 sports car is different, albeit in subtle and hard-to-spot ways, from a 1942 medium tank.

Actually, this is too generous. The NVIDIA puffery isn't even *that* accurate.

First up, processors on graphics cards aren't general purpose computing devices.

You *can't* make them do anything but graphics. Both a tank and a sports car can drive around a racetrack.

Graphics processors and CPUs aren't that similar.

Secondly, Gigaflops (billions of floating point operations per second) are not a trivially measurable thing, like storage capacity. The number of operations per second a given processor can perform depends on what sort of job it's doing.

Tank tasks are different from sports car tasks. Well, unless you're very rich and very eccentric, anyway.

Supercomputer tasks are just as different from game console tasks.

The data pipes to and from a traditional supercomputer's main memory therefore have to be huge. And the memory all has to be blazingly fast.

Nothing in the world based on a PC architecture – including the Xbox – will have performance worth a toss for these sorts of tasks, because main memory in personal computers is miserably slow by comparison. That's why PCs are so cheap.

A PC with a decent current processor and, say, 1024MB of RAM that the processor could somehow access as fast as it can access its Level 1 cache, would actually be able to mix it up with some traditional supercomputers.

It wouldn't be a whole lot *cheaper* than those supercomputers, though, and its external connectivity, among other things, would be pathetic in comparison.

PCs, fortunately, don't generally do supercomputer-type tasks. They don't *need* to pump gigabytes of data to and from main memory every second. Hence, they use relatively small but quite fast caches all over the place to take the load off main memory.

A PC CPU has two levels of cache built in, and a PC (or Xbox) graphics processor

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Fischer West's lounge box



Technical details

- Pentium III 550MHz
- 256MB RAM
- 20GB HDD
- GeForce2 MX400 64MB TV-out
- Logitech wireless mouse and keyboard
- Fan intake at front
- Fan blowhole on top
- Sony 51cm TV
- Side-mounted and dyed DVD drive
- All-wood case, mostly MDF
- Mercedes analog clock in front
- Switches: marbles in front of LEDs
- Neoprene slot for cable access
- Assimilated into lounge-culture

The story

I wanted a DVD player and I had a DVD drive and a couple of other PC components lying around. Made mostly from spares, this box was never going to be really spec'd-up. As long as it connected to the telly and stereo and played DVDs and MP3s without a hiccup, it would all be fine. I wanted something that would match the lounge room teak furniture, to look a little old and not-at-all like a PC.

I made several attempts at the framework – the first being steel – but with no workshop (or metalwork skills) to speak of, I soon resorted to the more easily worked wood. The choice to avoid right angles led to a nice shape that I guess is good for heat dispersion, but it made accurately measuring internal space and lining everything up very tricky. Let's just say it looks nicer on the outside than the inside. Next time I might build a machine with specs to match the looks. 

GLOBe's Electric Dream



Technical details

- AMD AthlonXP 1800+
- Swiftech MC462-A heatsink
- ASUS A7V266 mobo.
- 512MB PC2100 DDR RAM
- MSI GF4 Ti4600 128MB DDR
- SoundBlaster Live! Platinum
- Boston Acoustics BA7500
- Sony 24x10x40 PowerBurn
- Pioneer DVD
- 60GB Seagate 7,200rpm HDD
- 30GB Quantum 7,200rpm HDD
- 350W PSU
- Logitech Cordless mouse/keyboard
- 10m of aircon duct tubing

The story

I wanted to do something that would glow in the dark murky world of LANning. And the Electric Dream was born. The glass in the side of the case is called a plasma plate. It has been modded to run off the PSU and makes lightning effects inside the glass plate, which can also be set to pulse to music. The plate is 26in in diameter and almost covers the whole side panel of a Lian Li PC70 Towercase. A special housing was made inside the case to hold all the electrical bits and pieces like

sound sensitivity and lightning effect switches. The silver tube that comes out of the other side is 10m of aircon duct tubing that goes through a hole cut in the Perspex window and slides over my Swiftech MC462-A heatsink/fan. The other end of the tubing has a pair of stockings over it to catch dust and is placed outside through a window in the winter and onto the aircon unit in the summer. My AthlonXP 1800+ is o/c @ 1701MHz at temps of 28°C–33°C. I have had the tubing set up for around three years with no problems of condensation. 

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John T's Volt Box



Technical details

- Athlon 1.33 @ 1507MHz
- 512MB RAM
- GeForce2 GTS 64MB
- SoundBlaster Live!
- 80GB, 40GB and 13GB HDDs
- Enermax 550W PS
- Digital Doc 5 Fanbus (7 fans)
- Custom neon light switch bus
- Front network active and link LEDs
- Front headphone/mic sockets
- Front key LAN party lock
- Aphex Twin side logo
- Two car volt gauges
- Two 8in green 12V car neons

The story

My case modifications began last year when my Procase PC6618 housed a Celeron 500. It started with a 5mm high intensity blue LED on the front and one 12cm fan on the side. Next I added a front 8cm intake fan and a top 8cm extractor fan. I wanted to get original ideas together, hence the Aphex Twin logo, which is lit up via two red high intensity LEDs and mounted on the side of the case, and two car volt

gauges which I use to measure the two 12cm fan voltages. The top side fan blows over the CPU heat sink fan, which has a ducting made out of a 2.25L Coke bottle to aim as much air towards the heat sink fan as possible. The bottom fan starts to extract at 48°C (CPU). The paint I used is Holts Ford Blue Haze. I also made a neon light bus, two switches for the two neons, and one switch for a cluster of red LEDs behind the front intake fan.

STANLEY By DeVo



Technical details

- Athlon XP2000+ w/ Dragon Orb 3
- MSI K7T266 Pro-2RU USB2.0
- Onboard sound :P
- MSI GeForce4 MX460-VTP
- Kingston 512MB PC2100 DDR
- 40GB Seagate Barracuda IV 7200
- 32x8x4 'No-Name' burner
- Internal 10BaseT Hub
- 8 Case Fans
- Red Cold Cathode Light
- UV light
- Homemade LCD display
- Homemade Baybus
- 'Hammered Finish' paint

The story

Like most *Atomic* modz, mine started by reading the magazine, page 18. After gathering all the bits and pieces I needed, I got the help of my Dad to do all the cutting and painting work.

The fan holes were cut very slowly with a jigsaw, as was the window. Then two coats of blue 'Hammered Finish' paint were applied. The window is made from Perspex and was cut to size. I cut a hole in it for a fan, which doesn't help much with heat but it looks cool :P

I ordered a cold cathode off the Net to take care of the lighting and got a UV from Super Cheap Auto. I then got the help of a good mate Steve to make the Baybus and switchable thermal sensor. The case has a funky orange backlit LCD screen which can display all sorts of things like, temps, time, Winamp stuff etc. Then I just chuck all my bits and pieces in it, rounded all the cables and got a bigger PSU and of course, covered it with *Atomic* stickerage! Special thanks to Dad, Steve and David for help with this mod :-) And Ben for naming it.

id's Tim Willits interview

Next year will usher in a new age of graphical wonder for the PC with the release of *Doom III*. To get the inside story of what goodies we can expect, as well as to find out about the freaky stuff we're going to be able to create with this new uber engine, *Atomic* spoke with id Software's lead level designer, Tim Willits.



Atomic: How does the new editor for the *Doom III* engine compare to Radiant? I.e. is it going to be easier to use, are there many new concepts to learn, or does it use the same principles?

Willits: The *Doom* editor is built upon the same principles as Radiant. If you are familiar with Radiant you should have no problem working with *Doom*'s Editor. The new editor does have some interesting new features though. For example, the editor is built into the engine and will ship with the game. The render preview window is actually using the game engine for previews, and this gives us the ability to see what the lighting in the game will look like while working in the editor. The integrated architecture makes level building much faster and gives us more control over exactly how the game will look.

Atomic: What is the average number of polygons that designers should not exceed for one scene?

Willits: It is hard to calculate those numbers at this time – we are not finished with the product and John Carmack is still optimizing the code.

Atomic: Is it going to be difficult for skinners to create bump mapped skins when compared to traditional 2D textures?

Willits: Artists will need to master both modeling as well as 2D painting in order to make good looking new skins and textures in *Doom*.

Atomic: What is the largest open distance that you can create in a

map without bringing a high-end machine (P4 2GHz+ with GF4) to its knees? A measurement in virtual metres within the game would be understandable to our readers. As far as we've seen, the *Doom III* engine is only good for confined spaces, hence this question. . .

Willits: The *Doom III* engine can easily create large areas as demonstrated in the E3 presentation. The city that is shown in the intro is to scale. It is a huge area that the player can walk around in. We build areas that are appropriate for the design of the game, regardless of square footage.

Atomic: What are the primary concerns when developing levels for *Doom III* as opposed to the multiplayer maps featured in *Quake 3: Arena*?

Willits: *Doom III* is a single player game where the focus is on creating maps that put the player in frightening positions pitting them against computer controlled AI. Multiplayer maps are built for an entirely different play style. The two map styles are fundamentally different.

Atomic: How mod-friendly do you think *Doom III* will be? Would it be a fair assumption to say that with such an advanced engine and a focus upon atmospheric gameplay, uses of the engine would be less flexible than the *Quake* series?

Willits: Actually, it is the other way around. The *Doom III* engine is the most powerful engine that has ever been created – its power is almost

limitless. Mod users will have a vast arsenal of features and integrated tools to work with. I am looking forward to seeing what Mod users create with this game.

Atomic: Like most hardware nuts, we keep a close eye on John Carmack's .plan updates and his recent announcement of support for OpenGL 2.0. How do such shifts and tweaks in engine design effect the process of designing levels?

Willits: With every new technology advancement comes the ability for us to create new and different things in the levels. We discuss what features we would like to see in the game and John works to make those happen by tapping into every part of the technology he has available. We work together with John merging technology and design.

Atomic: Despite an eclectic early history, id software is now known for exclusively developing First Person Shooters. Do you see this as the future path for id, or does expansion into other genres beckon?

Willits: id software develops games that we like to play. We are a small focused group of developers creating top selling games that happen to be first person shooters. As long as we continue to enjoy these types of games we will continue make them.

Atomic: As far as you know, will *Doom III* contain any basic benchmarking functions?

Willits: The basic benchmark functions found in *Quake 3* will be available in *Doom III*. □

Doom III



Doom was THE game of the moment in 1993, and then, after a decent sequel a year or so later it promptly disappeared from our radar.

Well the good news is those malevolent miscreants from id's version of Hell are back again and very soon we will be knee deep in the dead once more.

Doom III was the hottest ticket at the recent E3 games expo held in LA. There were queues longer than the Activision booth to see the twelve-minute demo, and some people had to stand about like zombies for up to three hours to see the game.

Thankfully the only zombie action we saw was inside the special industrial style theatrette Activision used to host the presentations.

You often hear words like 'jaw dropping graphics' and 'cutting edge visuals' when people are describing games, and for once these sorts of comments are not only true, they are perhaps understatement. Doom III was astonishing to watch in full flight: the use of light, detailed zombies, demons and other Hell spawn, and the physics engine which kept it all moving were absolutely as good as it gets.

At this stage id is being very coy about the narrative that will drive the action forward. The demo sees a dodgy scientist opening the gates to Hell for his master who is presumably a demon lord or something like that. Beyond this we know the game is set on Mars in the year 2145, and that you play as a marine working at a very heavily guarded research centre. Interestingly id hired Matt Costello, the man responsible for the impressive narratives of games such

as 7th Guest and 11th Hour, to work on Doom III's story.

In gameplay terms Doom III will also mark a new direction for id. After being the King of multiplayer action id is now changing direction a little to focus on the single player aspects of Doom III.

There will still be some multiplayer mayhem, but it won't be the primary focus. Let's face it, this makes sense as shooting demon spawn in the delightfully rendered and genuinely scary Doom III environments is likely to be a lot more emotionally intense than blasting your mates.

The demonstration at E3 was all produced with the in game engine and new on the fly rendering system developed by id. There is already talk of this engine being licensed to other developers in much the same way the Quake tools were used to create many memorable games.

The new engine incorporates features such as bump mapping, skeletal collision detection, real time light source calculation, dynamic shadows and character models with scaleable levels of detail. All of these features were brought together during an impressive moment when a zombie knocked a light and went tumbling down the stairs, arms flailing and accurately hitting individual steps.

Doom III will not feature hordes of demons; instead it will pit you against a smaller number of more

deadly creatures and play more like Resident Evil than Serious Sam.

The demo we saw conveyed this sense of being stalked by small numbers of incredibly powerful creatures superbly. There was a demon with a massive tentacle that he fired at you, as well as a dog-like creature with rows of huge sharp teeth, which were revealed when a swinging lamp lit the scene of this abomination snacking on what was left of a zombie corpse. The facial and muscular animation in this scene was very impressive with rubbery hunks of meat being torn off the cadaver in a sickening display.

It was also chilling to see the shadows lurking your way. In the best horror movie tradition the demons cast a stretched shadow image on corridor walls as they hunt you down. Doom III should deliver some of the most genuinely frightening moments you'll ever experience in a videogame and this will be done by ditching the hordes of the earlier games and replacing them with fast, powerful and often hidden demons who stalk you with skill and determination. The character models in the demo were around 100,000 polygons at render, but scaled down in-game, and the action was powered by an Intel 2.4 GHz running at 1280 x 1024, but the final poly count and minimum specification PC will be lower than this. Might be time to think about an upgrade though! □

GAME DETAILS

WHY WE CARE: How could we not? This game is the granddaddy of all 3D shooters. Without Doom, games like Half-Life, Unreal, Quake, and Counter-Strike might never have been created.

DEVELOPER: id Software www.idsoftware.com

PUBLISHER: Eidos www.activision.com

PLATFORM: PC **DATE:** 'When it is finished'

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Unreal Tournament 2003



'...this is going to be a huge release, and a refreshing blast of old-skool online gameplay among the miasma of round-based military shooters that have been bogging down the online world.'

A few years ago Deathmatch was where it was at: one lone gamer against a pack of others, living and dying by the splash damage of a rocket. Everyone wanted a piece of the action, and on top were Unreal Tournament and Quake 3: Arena. Fast forward to today, and id is promising very limited Deathmatching in Doom III but Epic has gone all out to create Unreal Tournament 2003.

The concept of Unreal Tournament was mortal combat as sport, an idea that has been tweaked and projected forward in time to create UT2003. The back-story will most likely be fleshed out in the upcoming Unreal II, but basically, it's about evil aliens having taken over the earth and forcing humans to fight in an enhanced version of the Tournament.

Single player puts combatants straight into a league, with teams working their way through the ranks to be galactic champions.

UT2003 encompasses a variety of familiar gametypes, including Deathmatch, CTF and a slightly tweaked version of Domination. Added in the place of the much-loved Assault mode is a new mode called Bombing Run. That's right, Assault is gone from UT2003, mainly because the developer didn't see it fitting into the 'future sport' concept that defines UT2003.

Bombing Run is a speedball type game mode, in which a single 'bomb' spawns in the middle of a map. There are goals at each end and the

objective is for each team to get the bomb into the Goal. The catch is that the bomb carrier loses the ability to wield weaponry, and this will encourage teamwork and some deft skills to ramp up the goal scoring during a tournament.

Player control is via the familiar keyboard and mouse first person shooter standard, however the developer has extended the dodges from the original UT to now included double jumps (hitting jump when mid air will send you higher than you have ever been before) and special dodge moves.

The weaponry has been tweaked and added to for gameplay reasons. For instance, the rocket launcher's behavior has changed to primary fire doing the preload multiple rocket thing, with alternate fire launching an instant rocket.

One other funky trick is that the Link gun can be fired at a friend, which will in turn boost the damage dealt by their link gun, encouraging teamplay and adding extra strategic levels to the game.

All of this sits on top of the new Unreal Warfare engine, which is a joy to behold. The levels range from grungy industrial plants to expansive

outdoor areas. The premise of the game involves matches being held across different planets, which allows for a host of diverse environments to be created.

Levels are detailed but still show careful consideration to the flow of the game. Some of the original levels such as Lava Giant and Facing Worlds have received a makeover, but the majority of them are entirely new creations.

The game's 50-odd characters are detailed and diverse, with groups of players reflecting the different races involved in the fierce and furious intergalactic competition.

UT2003 has been delayed until later this year, with the hot rumor being that the recently released Unreal Warfare-powered America's Army acting as a kind of public beta test of the engine, with Epic using feedback to make UT2003 a solid game from the get go. With a rumoured 30 levels, a host of weapons and 50-odd characters this is going to be a huge release, and a refreshing blast of old-skool online gameplay among the miasma of round-based military shooters that have been bogging down the online gaming world. □

GAME DETAILS

WHY WE CARE: Good looking old school multiplayer stylings. Huge number of levels and characters. Facing worlds!

DEVELOPER: Epic/Digital Extremes www.unrealtournament2003.com

PUBLISHER: Gamenation www.gamenation.com.au

PLATFORM: PC **DATE:** 4th Qtr 2002

V8 Supercar Race Driver



'Codemasters had to get over 300 different licenses for this game, just so you could have the chance to get thrashed on all of the world's famous tracks against all of the world's top drivers and teams.'

With hits such as the Colin McRae and TOCA series under its racing harness, Codemasters has proved it knows how to make killer racing games. While the world waits in anticipation for Colin McRae 3, which promises more of the same for rally fans, a new title is in the works that is promising to bring the racing genre to new heights. Known in Australia as V8 Supercar Race Driver, this title is shaping up to be THE definitive car racing game.

One of the reasons the TOCA games proved to be so successful was the bump 'n grind, push 'n shove nature of the racing it centred around – none of that nancy boy, 'please don't scrape my paint job' F1 racing here thankyou very much. V8 If you've yet to try this style of racing, it really is something you must have a go at, as the tight pack racing offers a level of excitement not found in the F1 genre. V8 Supercar Race Driver promises another dose of this very popular type of racing, but this time around it won't be limited to just one racing series like the TOCA series.

Instead, Codemasters has included just about every major series of closed wheel racing from around the world – ambitious to say the least. The championships include Australia's V8 Supercars, UK's TOCA, Germany's DTM, the America's series and at least nine other international championships. Codemasters had to get over 300

different licenses for this game, just so you could have the chance to get thrashed on all of the world's famous tracks against all of the world's top drivers and teams.

A brand new game engine has been created for this title, which is to be released on PS2, Xbox and PC – and what an attractive engine it's shaping up to be. Apart from the sky-high polygon counts of both the vehicles and tracks that you'd expect to see, the sensation of speed that this engine delivers is simply phenomenal. From the demo we saw, it sometimes actually feels a little too fast, with chicanes and corners zooming by at what feels like light speed. Road surfaces make extensive use of bump mapping, leaving them looking as pock marked and uneven as you'd expect, while each vehicle has so many shiny surfaces that even Warwick Cappa would be happy looking at himself in the reflections.

One of the biggest features of the game that Codemasters is excited about is the deformation model employed within the game. This is known as the Finite Element Modelling (FEM) system, which is a physics based damage engine. As a result, expect to see your car falling

to bits and crumpling up like an empty Aluminium can better than ever before.

Perhaps the most innovative feature of this game is the fact that it mixes the racing genre with RPG elements. You only have the option to play one driver during this game, a rookie called Ryan McKane. Ryan starts off as a test driver, before entering the fully-fledged professional scene. The better you get on the track, the higher the chance you'll be offered a position on one of the top racing teams.

Modifications and tweaking of your car are also included, all from a 'life-like' 3D interface that does away with the traditional menus and drop down lists of the past. Hopefully this will help immerse players into the racing world, and help alleviate that "I'm just playing a game" feeling.

If you're not excited about this game after reading this preview, you're obviously not a fan of racing games. And once you've seen this game in action, even if you weren't a racer before, chances are you could soon turn into the newest petrol head on your block. You won't have long to wait, as the game is due on the 1st of October.

GAME DETAILS

WHY WE CARE: After seeing a demo of this game in action, as well as the huge feature list, how could we not care?
DEVELOPER: Codemasters www.codemasters.com
PUBLISHER: Codemasters www.codemasters.com
PLATFORM: PC, Xbox and PS2 **DATE:** 1 October 2002

Battlefield 1942



Lurking in the murky depths of bargain bins everywhere is a game called Codename Eagle, developed by a small Eastern European development team called Digital Illusions CE (DICE). This game stands out as having some of the worst single player gameplay in recent memory, which unfortunately kept the fun and innovative multiplayer side hidden from most gamers.

After Codename Eagle, DICE started Battlefield 1942, purging all memory of the craptacular single player mode and focusing on bringing the next generation of the multiplayer game to the masses.

Battlefield 1942 is set during some of the greatest battles of WWII, taking players from the mud of Europe to the sunny islands of the Pacific and the dusty shores of North Africa. All the classics are in there: Guadalcanal, Midway, Battle of the Bulge, Operation Market Garden and a surprisingly ANZAC-free Tobruk.

Rather than replicate the first person shooter style of the recent crop of WWII games, BF 1942 expands the scope, adding the ability for players to commandeer all sorts of land, sea and air vehicles. Gameplay is a nice balance of action and realism, with the focus being on fun battles, rather than accurate recreations of the intricate optical sights of a German Tiger tank.

Multiplayer gameplay styles include deathmatch and capture the flag, but the most interesting and rewarding style is called Conquest. This involves a series of capture points spread over the map. Each team has a set number of 'tickets', these are taken away when players die, and

holding onto capture points slowly wears down the opposing team's tickets. This method makes for dynamic, intense battles, which ebb and flow depending on how well each team is working. Flanks must be covered, defensive lines put in place and strategic resources cared for.

At the moment the Netcode is solid, even when playing on the US-based beta servers, and the final game will allow up to 64 players on each server. There is something really special about being part of an invasion force as player-controlled landing craft approach the beach and the coastal artillery barrages open up sending waterspouts into the air, inches from your craft. Up in the air, torpedo bombers try to send your carrier to the bottom under a hail of Anti-Aircraft Flak, while fighters try to soften up your eventual landing point. On land, machine gunners, Bazooka-wielding soldiers and even the occasional tank try to keep your force from landing.

Forget the clichéd pissy little Omaha Beach first person shooter recreation, this is a dynamic, ever changing game. Huge maps combine with human unpredictability to make each experience a new one, and in single player very canny AI allows for plenty of offline enjoyment.

Battlefield 1942 is getting close, and promises to deliver something for everyone. Falling into a nice niche between the hardcore depths of games like Tribes and the elegant simplicity of games like CounterStrike, Battlefield 1942 should be a gust of fresh air blowing through the stagnating online gaming community.

GAME DETAILS

WHY WE CARE: Battleships, tanks and planes, oh my! A great mix of realism and action which provides a breathe of fresh air for online gaming.

DEVELOPER: Digital Illusions CE www.dice.se

PUBLISHER: Electronic Arts www.ea.com

PLATFORM: PC and Xbox **DATE:** September 2002

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FIBRE OPTICS

Transmitting data via copper cable is so yesterday, copper interconnects and even CPU circuitry are all screaming for a better way to fire those ones and zeroes down the line – ‘Let there be light!’, says Simon Peppercorn.

We'll spare you the history lesson – suffice to say that we have come a long way from smoke signals. Morse Code as a transmission medium is rarely used, except for its novelty value, and probably by McGyver. Ethernet and other copper-based technologies are getting long in the tooth, as we move into a wireless world. But even the 802.11 wireless networks are faced with problems, such as incompatibilities across standards, security issues, interference from grandpa's hearing aid... and so on.

In the early 1970s, fibre optics was demonstrated as a feasible option for the transmission of data. Thirty years later, this is still very much the case and it's currently in widespread use in most industrial countries.

There are many reasons why fibre-optic technology is so popular, including:

- It is unaffected by electromagnetic interference and does not emit electromagnetic energy;
- There is less signal degradation caused by attenuation. Optical fibre is not conductive, so it can be used in areas where electrical isolation is needed; and
- It is relatively cheap to produce, and has a smaller diameter than copper, yet is capable of significantly higher data capacities.

Light is simply a form of electromagnetic energy. Its equivalent operating frequency is around 1,000,000GHz. You shouldn't be thinking of light, in this context, as something you can see because the parts of the magnetic spectrum used in fibre-optics are invisible to the human eye.

There are many types of optical fibre cable available, but there are two common ones in use. These are:

Single-mode Fibre, which transmits one signal per fibre. It has a core of only about 9microns in diameter and transmits an infrared light of between 1,300 and 1,550nm.

Multi-mode Fibre has a much larger core of around 62.5 microns, and can transmit an infrared wavelength of around 850nm to 1,300nm.

If you look at a piece of glass on its end, you may notice the green discolouration. This is because glass contains stuff such as copper and manganese and other bothersome impurities.

The fibre itself is constructed from an incredibly purified (although nothing is perfect) type of silica-based glass. This glass makes up the core of the fibre, which is clad in an optical material. The optical material acts as a mirror, reflecting the light back into and along the core, and this fibre then sits loosely in a PVC tube allowing it to bend and flex to its installed conditions. There is a layer of braided Kevlar

surrounding the PVC tube, which gives it strength, and this layer is also covered with an outer PVC jacket to protect the cable against moisture.

Fibre optic cable can be built from a few or many optical fibres, and is very flexible. You could tie it in a knot (although specifications suggest you shouldn't) and theoretically, the light signal will still merrily pass along it.

A typical basic fibre-optic system is comprised of an optical transmitter, the fibre-optic cable (obviously), a regenerator and a receiver.

The *optical transmitter*, at its basic level, encodes an electrical input signal into modulated light for transmission over optical fibre. The optical signal can be generated either from an LED (Light Emitting Diode) or a solid-state laser diode, which is mounted in such a way that the fibre picks up as much of the light as possible. In some cases, a miniature spherical lens is used to collect and focus the light into the fibre itself.

There are positives and negatives with both LEDs and laser diodes. LEDs are cheaper to produce than the laser diodes, but they are not as efficient in directing their light emissions. Laser diodes are more productive when looking at their output efficiency versus electrical input, however, complex circuitry is required and, there are issues relating to stability outside narrow temperature margins. LEDs are far simpler to operate, but light emitting from an LED cannot travel as great a distance as light from a laser diode.

The actual modulation of the light by the transmitter can be achieved by either switching the light on and off with a small transistor, or by varying the intensity of the light in a linear fashion, through the use of something called an operational amplifier circuit.

The ON/OFF modulation has a couple of forms.

There is the simple: light on = logic '1', light off = logic '0', but this can be varied with *pulse width modulation* which is a constant stream of pulses where logic '1' is a particular constant pulse width and logic '0' is a different constant pulse width.

Pulse rate modulation is a slight variation, where the pulses are all the same width, but the pulse rate varies to separate the ones and zeros.

Another method of transmission is by modulating an RF signal with other RF signals that are broadcast simultaneously as a single but complex waveform.

Light travels along the fibre using a phenomenon known as Total Internal Reflection. I flunked Physics so I won't go into detail, but the cladding surrounding the core has a low

‘IT IS POSSIBLE TO TRANSMIT 3.28 TERRABITS OF DATA PER SECOND, OVER THREE 100-KILOMETRE PIECES OF FIBRE. AND OPTUS RECKONS ITS CABLE NETWORK IS FAST? PFT! TO THAT, WE SAY.’

The diagram illustrates the internal structure of an X-Ray Fibre Optics cable. It shows a cross-section of the cable with labels for the 'Outer PVC Jacket', 'Kevlar Yam Strength Member', 'Central PVC Tube', and 'Actual Optical Fiber'. The 'Actual Optical Fiber' is depicted as a yellow core surrounded by a reflective cladding. Below the diagram, the text 'X-RAYFIBRE OPTICS' is repeated twice.

Below the first 'X-RAYFIBRE OPTICS' section is a graph showing four types of optical signals: 'Linear', 'On-Off', 'Pulse Width', and 'Pulse Rate'. The 'Linear' signal is a continuous wave, while the others are pulsed signals.

Below the second 'X-RAYFIBRE OPTICS' section is a diagram showing a lens emitting a light signal, which is then split into two paths by a beam splitter. The paths are labeled 'Light Signal 1' and 'Light Signal 2'.

At the bottom, the text 'ATOMICFIBRE OPTICS 02' is displayed.

refractive index, while the core itself has a high refractive index. The same principle applies when you are looking at something in a pool of water. Imagine a ray of light originating from an underwater source – when that light reaches the surface, part of it will be refracted into the air and the rest will be reflected back into the water.

As the light moves through the core, which has a high refractive index, it bounces off the reflective cladding, which has a low refractive index. The angle of reflection won't allow the light to bounce back on itself, so it continues forward down the line, theoretically bouncing off the reflective surface until it gets to the end.

As the cladding doesn't absorb any light from the core, the signal is able to travel great distances. Degradation in the signal does eventually occur, however, due to minute impurities and imperfections in the glass itself.

The higher quality fibres have significantly less degradation, often less than 10% per kilometre at a wavelength of 1,550nm.

The *optical receiver* at the other end of the line decodes the optical signal into the original signal that was encoded by the transmitter, and feeds it back into the network.

The light is collected by a detector, which is usually some type of photodiode with a sensitive reflecting area hundreds of microns in diameter – much larger than the fibre itself. This ensures that the receiver captures all the light emitting from the cable, without the same concern for alignment required for the transmitters.

The amount of light that does emit from the fibre is very, very small, so receivers often use a high gain internal amplifier to boost the signal. This amplifier must be proportional to the transmitter and the fibre, as they are easy to overload, resulting in distorted signals.

Somewhere between the transmitter and the receiver may sit an *optical regenerator*. Its role is very simply to regenerate the optical signal as it loses its strength and attenuates – it's fairly similar in concept to a repeater, which is used to amplify signal in Ethernet networks.

Light in space or some other vacuum travels at 299,800 km/s. In fibre cable, the speed is reduced by about a third. That's still hellishly fast.

To give you an idea of the capabilities of fibre, it is possible to transmit 3.28 terabits of data per second, over three 100-kilometre pieces of fibre. And Optus reckons its cable network is fast? Pft! to that, we say.

We could make some bold predictions here and say that within X number of years, we will all have fibre cable sticking out of the back of our PCs, for the most incredible broadband experience we could ever imagine.

But with the current state of broadband in Australia, and the lack of any apparent interest from telecommunications companies, we won't hold our collective breath.





3D tools clash for virtual supremacy

Look around in the entertainment world these days and chances are you'll come across computer graphics in some form or other. Ivon Smith compares the tools used to create them.

In movies, 3D graphics are everywhere. There are visual effects, digital backgrounds, 3D animated characters, digital doubles and entire computer graphics (CG) worlds. Vehicles of any ilk can be substituted with realistic CG versions, from Formula One cars, in *Driven* to the Green Goblin's hover pad in *Spider-Man*, and Lexus' futuristic cars in *Minority Report* (check out www.lexus.com), not to mention Naboo Star Fighters.

Sci-Fi and adventure series on TV are rife with CG modelling, blue-screening and animation visuals. The high-paced world of TV commercials also has prolific usage of 3D character animation, digital visual effects and CG product substitution. Stings, flying logos and all manner of 3D graphics are now par-for-the-course in our daily news and entertainment diets. We are so used to seeing this technical art form now that we tend not to even notice when a packet of soup or a bottle of shampoo dances across our screen and jovially invites us to buy it!

And as if this wasn't enough, there is also the incredibly diverse and exciting world of 3D computer games to keep us occupied and to keep the CG artists out there busy producing their wares.

So, considering all of these working formats in computer graphics, which one, if any, is best to work with? Which one produces the most appropriate results and fits the particular job we might want to do?

Back in the early days of computer animation the artists had to be coders as well. The CG scenes in the 1980s classic *Tron* were created by laboriously typing in code that mathematically described models, textures, lighting and animation. The only images seen by the artists were either hand drawn concept art or the final film grade renders. Given this state of affairs it is hard to believe that any of us have evolved to become CG animators. However, those days of the unwieldy *Tron*-esque production techniques are all but over (unless you want to be a CG coder, of course!). Now the 3D animation industry is filled with cool and evermore human-oriented graphics techniques that have helped Woody and Buzz Lightyear become on-screen playroom heroes, Neo morph into the virtual

mirror in *The Matrix*, Dr Aki Ross pretend to be a real-live-girl in *Final Fantasy* and Scooby Doo cavort his canine computer graphics incarnation around in his latest feature film.

So, this all begs the question: 'How do they that?'

Most 3D projects consist of several distinct stages within the production pipeline. This is true whether you are making digital effects in feature films, product visualisations for TV commercials, all-CG short or feature length films or producing the latest 3D platform and PC games.

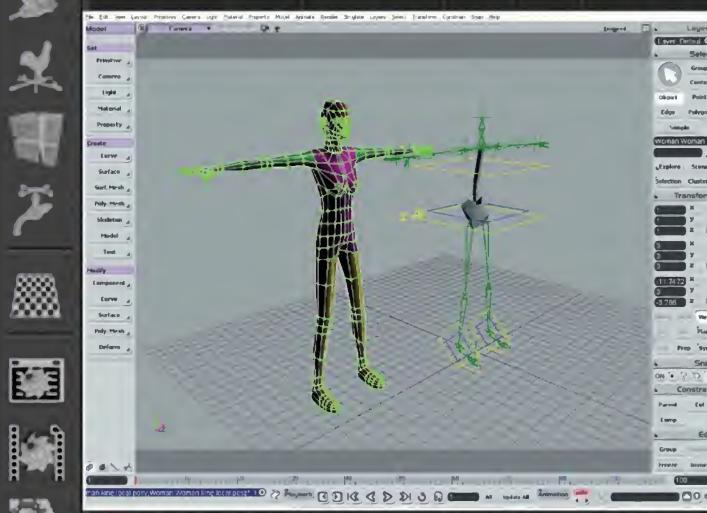
These stages can include:

- 1) Concept and initial artwork (ideas, story lines, sketches, storyboards);
- 2) 3D model making, texturing and lighting (building wireframe/polygon/NURBS (Non-Uniform Rational Bezier Splines) characters, sets, props and adding appropriate materials/shaders to them, creating virtual lighting rigs);
- 3) Character rigging and controls (building the virtual skeletons and controller systems that drive the movement in 3D character models, objects and scenes);
- 4) Animation (characters are moved and brought to life, virtual cameras dolly and panned, scenes are filled with activity, special effects initiated, animatics and pre-viz produced); and
- 5) Final rendering (images are rendered out with full FX, lighting and materials for film or TV; real time rendering is used for interactive games)

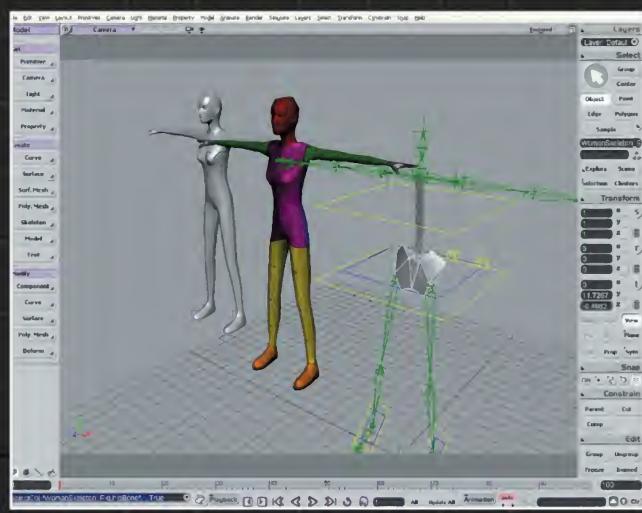
All of these stages are liberally interspersed with various production decisions, choices as to who and how, final output formats, budgets, art direction and definitely many a long night spent with lady caffeine as companion.

Concept and artwork

Firstly, as many a CG animator will attest to, the story comes first. Without a good storyline we may only have visual indulgence at best, aimless self-indulgent technical rambling at the lower end, and then some! The story is the spark and vision that drives the



ABOVE: SoftimageXSI's pre-built skeleton rigs and humanoid models



ABOVE: SoftimageXSI's pre-built including a sub-D human model

whole concept of the (hopefully) entertaining process, be it film, TV or game. The people at Pixar are among the best at creating and giving life to a story in the world of feature film 3D animation. Others have tried to follow, but they have truly mastered Ye Olde World of Disney's animated visions combined with today's very latest in CG animation and character techniques.

If you can produce feature length all-CG films that make even the most technically-oriented CG animators in the audience forget they are watching computer generated characters within the first five minutes of the film starting, you know you are doing a top notch job of giving life to a good story via great character animation techniques.

The initial artwork, concept sketches and storyboards come next. The 2D artist can be so important to the 3D work produced, by way of inspiration, guidance and reference visuals. Like a good story, without this the final product can flounder like a dying fish, flapping around but not going anywhere meaningful. So, all-hail the skilled 2D artist, for he shall be king!

3D modelling

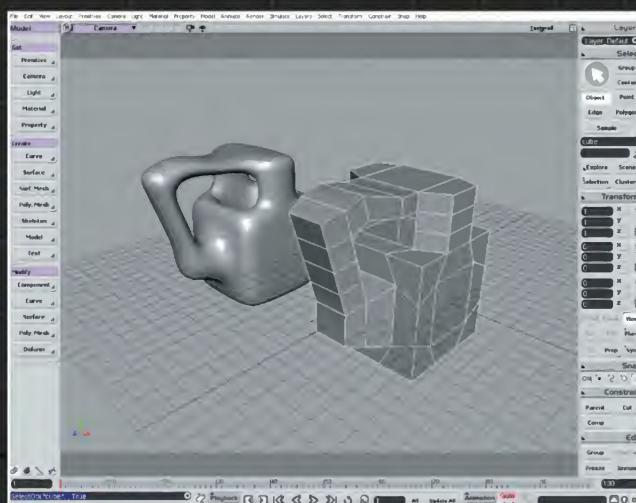
3D modelling can take many forms. As the technology improves, production deadlines tighten and efficiency techniques proliferate, the forms have changed accordingly. It used to be that the only way for games modellers to produce characters was to make pure polygonal models of very low complexity. Crash Bandicoot had square edges for the reason of polygon efficiency, and 'Make a human with 100 polygons' was once demanded of 3D games designers. Not so now: when we see games such as Dead or Alive 3 on the Xbox that feature smooth curvy characters of 20,000 polygons the progress we've made already is clear. 3D software has moved from the polygonal world of square and faceted characters to smoother realms of NURBS models, Sub-Division Surfaces (Sub-Ds) and Mesh-smoothing. This means that chunky, faceted 3D models have become smoother and more detailed. Still, 3D modellers in the gaming world use all kinds of tricks to reduce polycount as much as possible, and newer hardware technologies have evolved to smooth the edges that we would see as square. Generally, the games world still needs polygons to define the 3D surfaces of its models, and characters may only be allowed 2,000-5,000 polygons each, as the average graphics card still resides somewhere in the GeForce2-3 realm. But frugal modelling in the games world is one thing they can all be proud of. So we do get games with multiple characters, all of which look reasonably good

in worlds that reflect reality to a recognisable extent.

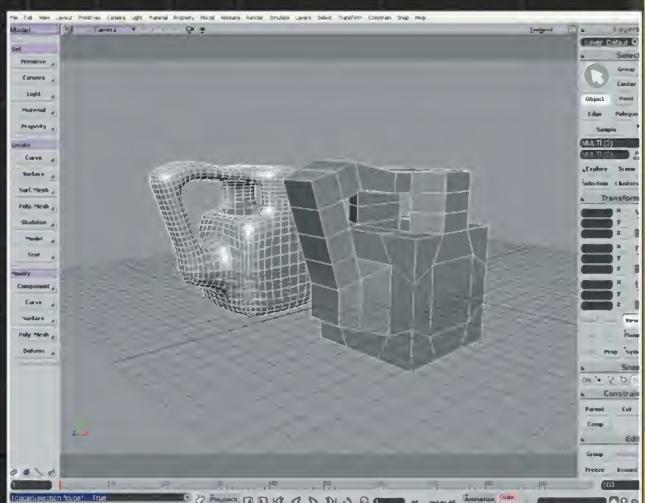
In the pre-rendered world of film and TV graphics, however, polycount is not such a pressing issue because display engines do not need to render all those polys in real time. Models and scenes can be higher complexity, have much more detailed geometry and textures, and don't actually need to be composed of our friend the humble planar polygon. NURBS surfaces have been the classic geometry of choice for producing curvy surfaces in complex organic-looking characters. Alias/Wavefront's Maya has been the NURBS-extraordinaire modelling software of choice for any professional worth their salt for a few years now, superseding the older workhorse, Softimage3D. NURBS mathematically describe 3D surfaces via curvy flexible lines, similar to vector lines in 2D applications such as Freehand, Illustrator or Flash. The advantages are that nature's own curvaceous surfaces in characters and objects can be reproduced true-to-form: trees can be truly gnarly and alien monsters wrinkly, flabby and 'natural' looking. NURBS surfaces also deform nicely, producing animated surfaces that mimic (again) nature's own. Skin can flex seamlessly when a character bends, runs and jumps; and ocean surfaces can be reproduced in all their chaotic, fractal-based behavioural patterns.

However, NURBS have also typically been difficult to work with when composing character models. Maya and Rhino have both had a reputation as great NURBS modellers, but even so, welding, joining and smoothly connecting isoparms that describe very complex three-dimensional curved surfaces can be challenging for 3D artists and software alike. The memory overheads can also be stifling to all but the most powerful of 3D graphics cards.

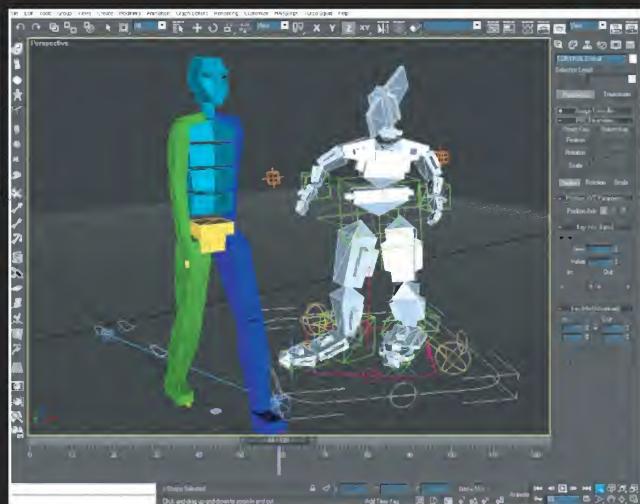
Enter the more recent world of Subdivision Surfaces (Sub-Ds). Sub-Ds look similar to NURBS surfaces, however they start out as simple polygon-based geometry. Imagine the faceted surface of a well-honed gemstone: this is similar to a typical, low-poly 3D object. Each polygon can have three or four edges creating a flat, planar 2D section. Now take each flat face and substitute it with many smaller faces, each of which can be angled to better simulate curved geometry — this is roughly how Sub-Ds work. We still have an underlying geometry of polygons, but we're able to display far greater detail and more curvy surfaces. We can also jump between Sub-D and simpler polygonal surfaces to reduce memory usage. For instance, due to graphics card limitations, we may want to model objects in polygons, but actually render the final output for film or TV via Sub-D surfaces for smoother more natural-looking objects. We can even interactively dial-in how much



ABOVE: Smoothing of subdivision surfaces on a low poly object in SoftimageXSI



ABOVE: The higher poly count created using subdivision surfaces



ABOVE: Character Studio's Biped skeleton with a motion capture animation sequence and 3ds max4's native Bones and Controllers in human form

smoother our Sub-D surfaces are than our lower poly versions to get the exact results we want. In fact, Sub-D surfaces are so useful and convenient that 3D software giant Softimage has backed this technology in its latest flagship 3D software SoftimageXSI over and above the usage of NURBS surface technology, realising its potential to economically replace the older surface creation methodology.

Discreet's 3ds max is a classic games-oriented 3D modelling and animation software, however, it too has begun to use Sub-D technology within its 3D toolsets, easily allowing simple models to be smoothed into much more organic-looking shapes without the overheads associated with NURBS.

Character rigging and animation techniques

Character rigging and animation are among the most technically demanding areas of 3D art. They remain the most crucial to pull off the illusion of life and movement within scenes and characters. To move the characters that have been built from polygons, NURBS or Sub-Ds (or whatever) we need to 'rig' them — i.e. build complex skeletal control systems through which we indirectly drive the movement of our models. Structural skeletons (bones) may be built within the model that selectively capture sections of the model geometry and carry them around as we animate the underlying structures. For very advanced character animation there may also be the need to build and animate underlying musculature, tendons and even subcutaneous fat layers to reproduce convincing animal dynamics. *Walking with Beasts*, *Shrek* and *Scooby Doo* all make extensive use of these advanced techniques to fool our eyes into thinking these creatures actually exist, live and move around.

Some 3D software relies on skeletons being created bone-by-bone and secondary control systems being added and then finally animation can begin. Others, such as the 3ds max plugin Character Studio, allow entire pre-built skeletons to be added to characters with the click of a few buttons. SoftimageXSI also has complex or simple pre-built rigs reducing the laborious work of adding bones to characters. Muscle deformation and even tendons can also be replicated as sub-surface geometry influences during the animation process. For non-flexible characters, such as robots, sometimes simpler rigs can be produced that don't need to take into account skin and muscle deformations.

Animation is the process of giving life to the 3D models and characters. Keyframing is the simplest form of moving objects.

Basically, we position an object in 3D space at one point in time and a keyframe is created in the timeline. We move it to another position at a different time, and another keyframe is created. The software linearly (or otherwise) interpolates the trajectory between the two keyframes in time. Over the given time frame the object moves from point A to point B. Obviously, for subtle or complex motion this can be a laborious process. And for fully rigged characters, with each nodal point of their body (hands, feet, hips) needing to be moved separately, replicating life is a long process. However, for the animator to have full control of all character movements, this is still a preferred method used in films like *Shrek* and *Monsters, Inc.* It also allows the stylised character animation that we have become accustomed to over generations of watching cartoons, and for fantasy characters keyframing allows us to just make up how we think they will move. Games characters benefit from keyframing because it is simple, editable and can be easily looped into walk, run or attack cycles.

For much more realistic character movement we may use motion capture (mo-cap). This technique tracks actual movements of key points of human or animal bodies via magnetic tracking sensors or video tracking of coloured dots placed on the subject. This motion data is then stored and fed into 3D software that can relay each nodal trajectory onto its equivalent 3D virtual node on the character. The data is complex, very difficult to edit if we want to make changes but does produce smooth natural motion. *Final Fantasy* made extensive use of body actors to animate its CG human characters via motion capture.

However, for movements beyond the realm of humans, motion capture can prove more trouble than it's worth, and skilled animators might prefer to keyframe custom movements. Blending data from motion capture to keyframe sections of animation can be messy also. But there is a lot to be said for being able to load mo-cap data files onto a Character Studio biped character and have them dance around, roll on the ground or chase a butterfly almost instantly.

Two very powerful animation techniques that have only just recently become popular, particularly in SoftimageXSI and Side Effects Houdini, are Non Linear Animation (NLA) and Procedural Animation. NLA allows simple drag-and-drop editing and blending of entire animation sequences with one another, transitioning from say, a walk to a run to a jump seamlessly. Such animation clips can also be dragged onto entirely different characters, so sharing of animation data now is easy and flexible. Even further from the rigid, sequential world of keyframing is Procedural Animation. This allows highly complex animation sequences to be produced via equations that describe multiple objects moving or deforming in ways that are actually interdependent of one another. This is much more like the way things happen in the real world, and although complex to set up, can go a long way towards replicating movement and growth patterns that happen in nature. For example, a scene could be set up in which a seed starts to grow into a plant using randomly generating procedural modelling and animation. As it grows, it influences soil around it that might be pushed out of its way, and which in turn may roll down a slope and knock over other vegetation in the area. All of this can be calculated via equations of 'growth' rather than moving objects with keyframes or traditional dynamics solutions.

The 3D techniques we use as animators and modellers are advancing all the time, and more flexible solutions are developing. Which technique we use is a choice of what look we are going for, our budgets and deadlines, and how simple or complex we want to go when the director or designer comes to us and wants to change the sequences at the last minute.

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Material: Copper C1020
Fin pitch: 1.2(mm)
Fin thickness: 0.45(mm)

Clip

Material: Steel SK7 / Nickel Plate



CPU Cooler JAC565C

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Intel P4 2.4ghz

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Dimension: 70L x70 W x 25H(mm)
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Safety Approvals(Standard):CE;AU

Heatsink

Material: Copper C1020
Fin pitch: 1.7(mm)
Fin thickness: ~0.5~(mm)

Clip

Refer the drawing



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Specification

Weight: 252 g
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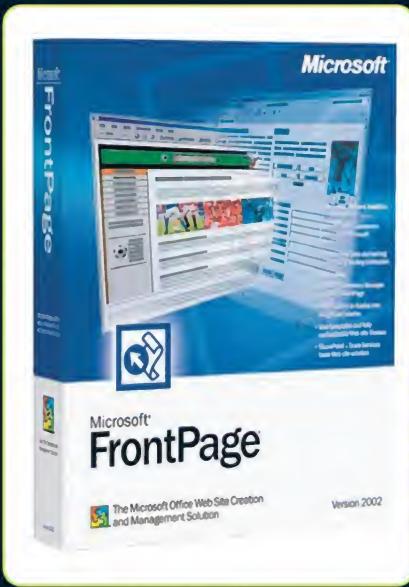
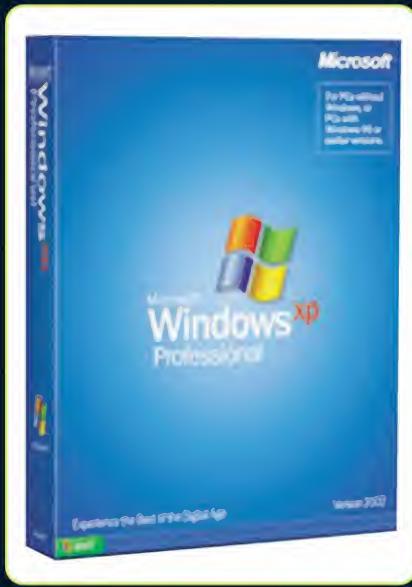


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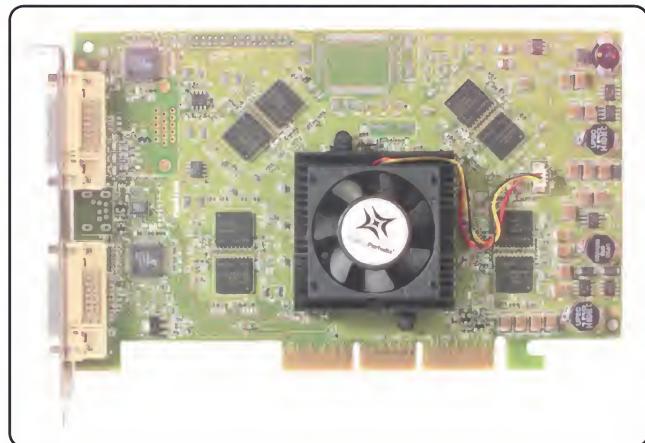
The survey closes on September 2nd, 2002. 32 winners will be randomly drawn from survey entrants and will be announced at www.atomicmpc.com.au on Wednesday 4th September and notified by email.

Matrox revolutions

Having seen the promise of Parhelia, John Gillooly grabs a card to see just how Matrox delivers.



ABOVE: The lower clocked OEM version of Parhelia 512



ABOVE: The retail version of the card runs at higher core and RAM speeds

3D is not as easy as it looks. Forget paltry little CPUs – the graphics processors are now pushing the boundaries of the current manufacturing processes harder. New features and the ever present need for speed are creating a subset of the industry moving at a pace that makes Moore's Law look like a set of training wheels. If you fall off, don't even think about getting back on.

It has been a long time since the granddaddy of video chipmakers, Matrox, released a card that could be considered bleeding edge by performance hungry gamers. When the G400 first hit it provided gamers with a competitive option to the NVIDIA TNT2 Ultra and 3dfx Voodoo3 fighting it out for the title of 3D king at the time. The G400 added new features such as environmental bumpmapping (EMBM), which was pretty much the precursor to the introduction of hardware transform and lighting.

Matrox has always had a reputation for producing cards that emphasised image quality over pure balls-to-the-wall performance, a reason why those cards are still revered by Photoshop heads and the like. Features like EMBM were revolutionary for their time, however they were soon superseded by the NVIDIA-led charge towards more extensive hardware transform and lighting functions.

When it comes to 3D gaming, no one doubts that NVIDIA is the current king.

But that could change: we are now on the cusp of a new phase of 3D. DirectX 8 is on its last legs, even though tangible

support for its features is still rare in games. DirectX 9 promises a lot, with a lot more flexibility built into the programmable pixel and vertex shaders that comprise modern transform and lighting hardware. Even the venerable OpenGL API is about to undergo a refresh to version 2.0, which should go some way to regaining the ground lost to DirectX over the past few NVIDIA-driven years.

But new APIs are just a small part of the evolution. Both the major 3D names, NVIDIA and ATI, have supposedly revolutionary hardware just around the corner. 3Dlabs, the OpenGL 2.0 spearhead, has a potent solution in the form of the P10 chipset, and good ol' Matrox has chimed in with the partially DirectX 9 compliant Parhelia-512.

On the cards

We took a look at the extensive feature set of Parhelia-512 in *Atomic 18* and at the time information about the actual cards was still scarce. We have had production Parhelia cards in the *Atomic* labs for several weeks now and have had a good chance to evaluate them from both the benchmarking perspective and the more intangible 'experience' angle.

There are two types of Parhelia currently available. Both cards sport 128MB of DDR RAM, interfacing with the Parhelia-512 chip through twin 256-bit interfaces. The boxed retail variant of the card has a core running at 220MHz, with the RAM running at 550MHz DDR, while the slightly cheaper OEM version has a

core at 200MHz and RAM running at 500MHz DDR. As you can see, the cards are visibly different: the retail card has a lighter, khaki PCB and the OEM card uses a green PCB.

In terms of frequency, the cards are much slower than the competing NVIDIA GeForce4 Ti and RADEON 8500. This is mainly an issue for the core speed, as the 512-bit memory interface means that Parhelia has the luxury of ample memory bandwidth (and it also increases the cost of the card).

Parhelia's design has the subtle attention to detail that characterises Matrox. The arrangement of the BGA packaged DDR RAM chips around the GPU hasn't just been done to appease the connoisseurs of symmetry. It means that all the RAM chips are at the same distance from the Parhelia-512 chip, which helps minimise issues with memory access. Similarly, the card sports dual DVI outputs rather than the more common D-sub/DVI output combo seen on competing multi-monitor cards (the notable exception being Gainward's GeForce4 Ti4600).

The retail card ships with a DVI to D-Sub adaptor for those of us (the vast majority) who still use non-DVI monitors, and for triplehead there is an adaptor for the secondary DVI output that allows the connection of two D-Sub monitor cables. Varying monitor configurations are easily set up during the driver installation (which also provides helpful advice on which monitor cable connects to which port), and can be managed with the included



ABOVE: Image quality comparison images; from left to right – GeForce4 Ti, Parhelia 512, Radeon 8500. Each method effects textures and edges in different ways

Matrox Powerdesk Software.

One feature currently lacking from the drivers is the ability to overclock the card. The good news is that the next iteration of Matrox's MTS Tweak utility is available from the Matrox Users site (www.matroxusers.com). But rest assured, Parhelia is overclockable, even though Matrox insists that overclocking the card will reduce its lifespan significantly (it's the standard disclaimer in these cases).

Benchmarking madness

Thanks largely to NVIDIA, the company that once pushed features over speed, most of us see the 3D race in terms of pure frames per second speed. This is mainly a symptom of the minimal difference in feature sets between high-end 3D gaming cards nowadays; and in the relentless pursuit for good performance at a good price we focus mainly on speed.

When approached from this viewpoint Parhelia sucks. If released a year ago it would have been hailed as a GeForce3 killer, but not now that we have the high Speed GeForce4 Ti series and the ever-maturing ATI RADEON 8500 to contend with. Heck, ask anyone and they will tell you, Parhelia is no speed demon. Matrox says it, local distributor Focal Point says it and Bennett says it on an almost hourly basis.

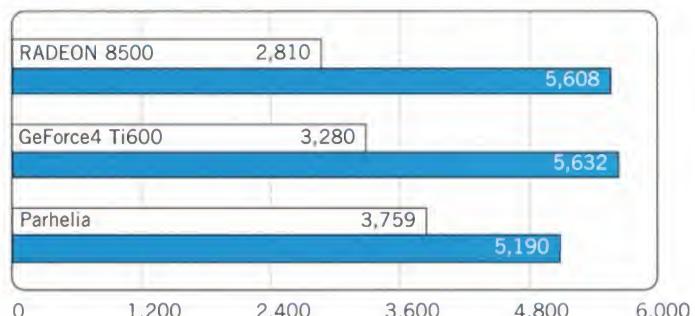
But that's not what Parhelia is all about: it's about tradeoffs; of sacrificing excess frames and ultra high resolutions for better quality images at acceptable framerates; of adding some very niche, but highly enjoyable features to our gaming experience; and taking a big wad of cash out of our pockets in the process.

These extra features come in the form of surround gaming, 16x fragment antialiasing (FAA) and anisotropic filtering. Matrox keeps screaming it is all about image quality, a claim it can rightly make as perhaps the last of the big names in 3D with control of manufacturing all the way from chip design (with a slight detour to UMC for fabrication on a 0.15micron process) to the production of the actual boards themselves. This is a big contributor to the cost of the card, as it means Matrox can choose only the best components and circuitry for the Parhelia boards in order to continue the commitment to image quality.

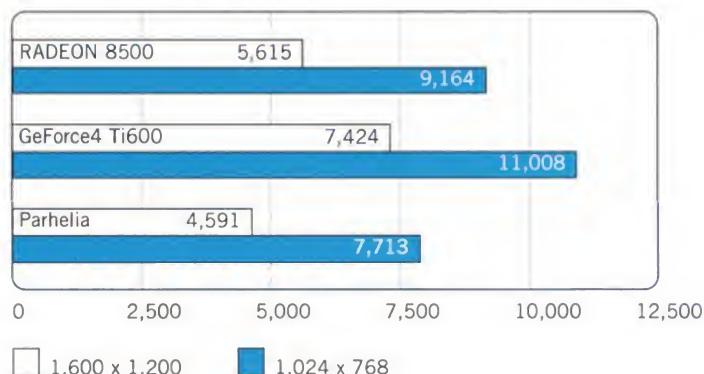
Now, I am all for giving away a few frames to make the image better, but there is always going to be a limit. One of the reasons that antialiasing and anisotropic filtering are still considered luxuries on NVIDIA and ATI cards is due to the huge performance hits they cause at high levels.

Matrox relies on the width of the memory interface and more refined techniques to make 16x FAA and anisotropic filtering a reality, with some very worthwhile side effects. 16x FAA works purely on the edges of polygons, where the jagged edges actually occur, smoothing them out while leaving the rest of the image intact. This eliminates the texture blurring that accompanies

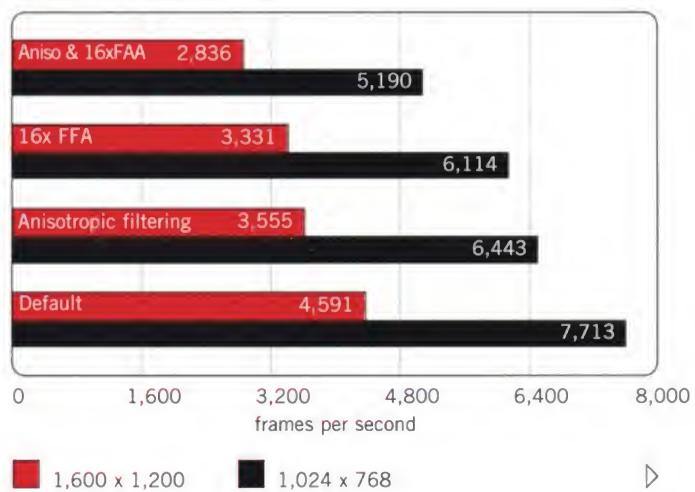
3DMark2001SE Pro – optimum image quality



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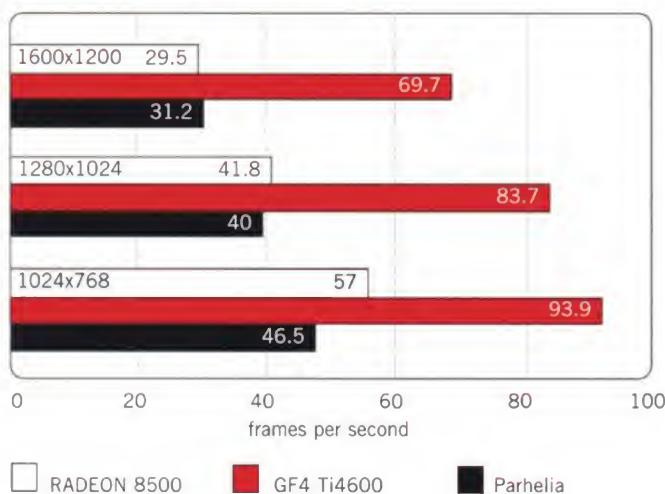
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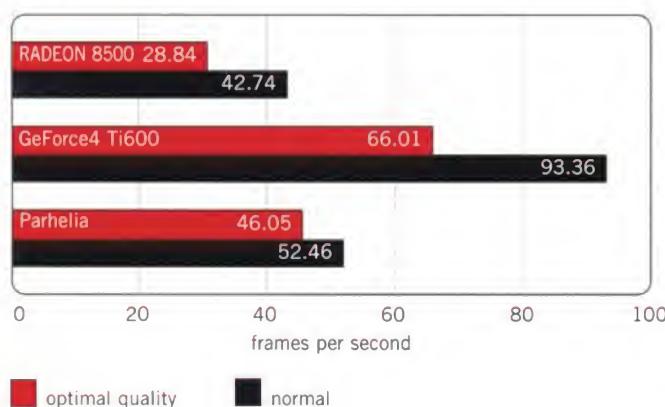


'To test at the level Matrox has aimed the Parhelia, the tests were run with all of the cards at the maximum image quality. With Parhelia this is 16x FAA and anisotropic filtering both running together. For the GeForce4 Ti4600 this involved setting the card to use 4xS antialiasing.'

Serious Sam: SE – quality settings



Dungeon Siege



competing antialiasing methods, and leads to a crisper image, with smoother edges.

There is one problem with 16x FAA though: it will not work on stencil edges. Stencil buffers are being used more in games nowadays, and while 16x FAA will work on all normal edges in a scene, the stencil edges will remain jagged. Similarly, some rendering techniques will lead to stencils appearing miscoloured. Matrox states that this is not too big a problem as stencils usually comprise only part of a scene, and it recommends that 4x super sampling antialiasing is used in the rare cases that stencil buffers are a major part of the games rendering.

This is all well and good, but benchmarking is still needed to see just how much of a performance hit the features deliver, and how this compares to the competing solutions. We tested the retail Parhelia-512 using a high-end testbench to minimise the effect of slowdowns caused by the system. This setup consisted of a Pentium 4 2.53GHz, ABIT BD7-II RAID motherboard and 512MB DDR RAM. The Parhelia has been compared to a GeForce4 Ti4600 and a 64MB RADEON 8500 card.

The first comparison is a simple one: 3DMark2001SE Pro was used to compare the three cards at 1024x768 and 1600x1200. This easily shows why Parhelia cannot compete with the GF4 Ti4600 and RADEON 8500 in normal testing: it falls way behind both cards in both resolutions.

In order to test the cards at the level Matrox has aimed the Parhelia, the tests were also run with all of the cards at the maximum image quality. With Parhelia this is 16x FAA and anisotropic filtering both running together. For the GeForce4 Ti4600 this involved setting the card to use 4xS antialiasing. This new generation Quincunx-like method involves a combination of 4x supersampling antialiasing with added anisotropic filtering. In the case of the RADEON 8500 this meant simply setting the slider bar on the new Catalyst drivers to optimal quality, which added Smoothvision antialiasing and anisotropic filtering. As a side note, all three cards use a different anisotropic filtering method, which makes a straight comparison difficult, and it's a major reason why we chose this 'Optimum Image Quality' comparison. We ran



ABOVE: Unreal Tournament 2003 running in 3072 x 768 resolution for display across three monitors

the tests at 1024 x 768 and 1280 x 1024 because at 1600 x 1200 both the RADEON 8500 and the GeForce4 Ti4600 cannot use all the methods and thus revert to normal settings. This makes the number much more interesting, with Parhelia only slightly behind at 1024 x 768 and quicker than both the competitors at 1280 x 1024. The performance hit when compared with the normal tests at 1024 x 768 really demonstrates the benefit of Parhelia's 512-bit memory interface, as it loses around 2,500 3DMarks with the features turned on. In comparison, the RADEON 8500 loses around 3,500 and the GeForce4 Ti4600 loses an astounding 4,500 3DMarks when the image quality is bumped up.

For completeness, the results for the Parhelia when each of the extra features is enabled have also been included. These 3DMark2001SE Pro scores demonstrate the minimal hit that comes thanks to the 512-bit memory interface when each feature is enabled.

We have also included some of 3DMark2001SE Pro's inbuilt image quality comparison images, which show quite clearly the relative benefits of each method. The Parhelia manages to escape the inherent blurring associated with the competing antialiasing methods through the focus on edge antialiasing only, and the other two cards blur the texture to varying degrees. In practice whether or not you notice this will definitely be dependent upon what game is running at the time, but it is definitely something to keep in mind.

The second DirectX-based benchmark we used makes its *Atomic* debut in this feature. This is Gas Powered Games' Action RPG title *Dungeon Siege*. The *Dungeon Siege* benchmark involves a custom map that spans a good selection of the in game environments and enemy

types, spitting out an average framerate at the end. We chose to use *Dungeon Siege* to represent a genre other than the traditionally frame guzzling first person shooter (FPS) games are good for benchmarking because they deliver what could be considered a worst case scenario for the load placed on the 3D card. The tests were run at 1024 x 768 32-bit colour with all settings maximised apart from shadows, which place more of a load on the CPU than the GPU in the *Dungeon Siege* engine. Again we tested at normal driver settings and then with our optimum quality settings. Again the GeForce4 Ti4600 proves to be light years ahead of the other cards at normal quality. The big surprise is the poor showing made by the RADEON 8500 in the game. Parhelia's success comes in the minimal performance hit delivered when the extras features are enabled, and in a game such as *Dungeon Siege*, which has a maximum resolution of 1024 x 768, features such as antialiasing are much more important than they are in games which allow higher resolutions.

The next test is the OpenGL based *Serious Sam: SE*, using the in-game quality settings. This clearly shows the superiority of the GeForce4 in these tests, with the Parhelia staying neck and neck with the RADEON 8500.

We also tested the cards in OpenGL with *Quake3: Arena*, but the game is now really showing its age and was eminently playable on all the cards – with many frames to spare.

Overall the benchmark results show a consistent story. While the Parhelia does indeed perform well with the extra features enabled, cheaper cards consistently beat it. The issue is just what framerates are considered to be playable, with our research showing that most people are reasonably happy around the 50-60fps mark.

Triplehead

Certainly the biggest wow factor with Parhelia is surround gaming, because in terms of pure gaming luxury not much comes close. Surround gaming uses the Parhelia's triplehead to display games at resolutions of 3072 x 768, 2400 x 600 or 1920 x 480. This works in several ways: some existing games will stretch out the image to fit the skewed resolution; others allow you to tweak the field of view (FOV) for peripheral vision; and still more games will be designed to specifically support three monitors.

At launch, Parhelia supported surround gaming in a handful of games. Most Quake 3 engine games work via custom resolutions and tweaked FOV settings, as does the upcoming *Unreal Tournament 2003*; *Tribes 2* is now supported after recent beta patches; *Neverwinter Nights* works right out of the box; Microsoft's *Flight Simulator 2002* works via the normal menu settings and there is a swag of other titles on the way. Matrox has now announced 25 different games, the biggest of which is probably the massively multiplayer *Star Wars: Galaxies*, and there are many more being worked on. For the first generation of triple head-supporting games users will either need patches or configuration file tweaks, but as time progresses support will become available out of the box. However, Matrox is presently more than happy with the reaction from game development companies.

Implementations of surround gaming will vary depending upon the amount of focus a developer wants to put into it. *Serious Sam* developer, Croteam, is planning to add support into the engine for three independently driven displays, allowing three people to play on the same system without resorting to the indignity of a three way split screen. ▶



ABOVE: The use of a wider field of view in *UT2003* makes for increased peripheral vision, however the resolution tweaks currently distort the weapon models



ABOVE: Triplehead gaming in Neverwinter Nights, jaw dropingly immersive



ABOVE: Mmm... naked Parhelia

We tested out the surround gaming functions in the only way possible: strapping on multiple monitors and having a blast. The first set we used had small 15in BenQ TFT screens with fairly wide bezels. Unfortunately for our wallets the smaller screen size really detracts from the immersive nature of surround gaming.

So we then tried again, this time using 18.1in thin Bezel Eizo screens, and wow, what a difference! The larger screen size sucks you right in, and in games like Unreal Tournament 2003 this is a truly stunning experience.

There are some slight downsides in first person shooters: despite the facts that resolution and FOV settings are easily tweaked, and it's easy to ensure that the HUD sits only on the centre screen rather than being smeared across the bottom of all three, the aspect ratio for some screen aspects is slightly off. This means that console text is squashed and unreadable and on-screen weapons look distorted due to the skewed aspect ratio. After a while this becomes less noticeable, but it is a conscious trade-off.

2D for...

The intangibilities make this card such a strange creature, and a difficult one to objectify. Perhaps the hardest of these is image quality. The card comes supplied with a customised version of Colorific's

Coloreal software, which simplifies image calibration while helping you to set up multiple monitors properly.

The resultant desktop image is better, as long as you are using a good quality monitor. On some of the older monitors in the labs there was little noticeable difference between the Parhelia, GeForce4 Ti and RADEON 8500 cards, however on a decent quality Trinitron-based monitor the difference was very noticeable, so much so that it had us searching for the antistatic wipes to clean the sucker.

The hardware-based glyph text antialiasing is another feature that is more noticeable on some monitors than others. On CRT screens it does not have much of an impact, however it makes a very noticeable improvement to text quality on LCD monitors.

The connoisseur's card

Ever since ATI shifted its business strategy from card manufacturer to chip manufacturer we have become used to videocard pricing being intrinsically tied to performance. This is largely due to the incredible pressure that stems from so many companies competing to make a fast card for a low price.

Many people have noted that the once stellar image quality associated with ATI cards has slipped, and this is a direct result of cheaper components being

employed. Parhelia does offer this improved image quality, but the combination of using high quality components throughout the card with the expensive and complex 80 million transistor GPU means that it will inevitably be more expensive than the current generation of competing solutions – however, price is important, and this is the major factor holding the Parhelia back from making major inroads into the gaming community.

The result is that the card will probably be more suited to people for whom 3D gaming is only part of their computing needs (but still an important one), or those who don't mind trading framerate for image quality.

Flight Sim buffs especially will relish the increased view provided by surround gaming, but for hardcore first person shooter nuts the average framerates that Parhelia provides will be somewhat of a let down. Matrox has well and truly telegraphed its return to 3D contender. Parhelia has all the ingredients needed to be king, and hopefully the next iteration of the card will demonstrate this. After all, it has taken ATI several years to get back up to the position it is in against NVIDIA, and Matrox is now close with its first serious 3D outing in years. A higher clock speed Parhelia could be a nasty card indeed... we can only wait and see.

- Parhelia cards were supplied by Focal Point Computing, Australian distributor for Matrox products (www.focalpoint.com.au) Ph: (03) 9372 6600
- Eizo LCD screens were supplied by Anitech Pty. Ltd. Australia's National Reseller for Eizo (www.Eizo.com.au) Ph: 1800 70 50 60

- BenQ TFT screens were supplied by BenQ (www.benq.com.au) Ph: (02) 9714 6800
- Thanks to Chris from Gamenation (www.gamenation.com.au) for the sneak peak of Unreal Tournament 2002.
- Thanks also to Kamran Ahmed from Matrox (www.matrox.com) for assistance with technical queries.



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EIZO have brought many "firsts" to the monitor market in the area of technical design and innovation. For example, in 1998 EIZO were the first manufacturer to release 18" LCD's and today most major finance houses utilise them. Now EIZO have released not 1 but 3 firsts.

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2. The L771 was the first 19.6", 1600x1200 resolution LCD.
3. The L461 was the first new generation 16", 1280x1024 LCD monitor.

Don't settle for second best, second isn't here yet.





REVIEWS



Parhelia has been a real bastard of a card to benchmark. John Gillooly and Bennett Ring's opinions initially seemed to vary on Parhelia, so what follows is the email slanging match that occurred (minus the swearing and references to each other's mothers).



JG: Dude, you've had a chance to play around with the Parhelia – what does a one-eyed framerate whore like you think of it?

BR: I was impressed by the edge antialiasing technique – no jaggies without blurred textures. And then I tried moving – bad idea. I like my games to average 40-50 frames per second, not 15-20.

JG: Run it at 1900 x 1532 and of course you'll have those problems. And adding 50 bots at newbie level may boost your ego but it's hell on system resources.

BR: Actually, I ran it at 1024 x 768, in an online game of America's Army with eight players. Did I mention how much America's Army rocks? I also fired up Jedi Knight II, which was more playable, but it still dipped to 30-40fps – acceptable if you're a light weight wannabe gamer, such as yourself, but not competitive for pros like me.

JG: Strange, I thought pros ran games at 3200 x 200 with the detail turned down. But I digress: did you try lower resolutions? I was fairly impressed by lower resolutions with 16x FAA and anisotropic filtering. Plus the HUGE text makes trashalking feel so much nastier! When DiE nEwBiE sCuM!!! fills the screen it gives me a warm fuzzy feeling.)

BR: Why would a serious gamer run at such a low res? Sure, high framerates help, but if you're running at such a low res it can make it harder to spot things, which is worse than running at low fps. We've got the hardware today to run at high detail, and still get huge framerates. Well, that's if the hardware is made by NVIDIA or ATI :) I tried the Parhelia with edge antialiasing at 800 x 600, but noticed the same problem all cards have when running at this res with FSAA enabled: pixel size. Sure, you don't get jaggies, but it looks shit. 1024 x 768 is the minimum I'm willing to run with FSAA enabled (and that's quite grainy). And you thought I didn't care about picture quality!

JG: Fair comment. I personally love running at higher res (bless you Valve for raising the Half-Life res to 1600 x 1200 – DOD never looked so good), but I haven't had issues with pixelation at lower res on Parhelia, and 16x FAA looked damn sexy. I didn't even have problems playing American Propaganda Machine 2003, oops, I mean America's Army. How about other features? You've seen UT2003 running on three monitors and it looks damn sexy. You like flight sims as well as your first person killing simulators – whaddya reckon about surround gaming?

BR: Here's where I get angry. Surround gaming = cheating. When I first started playing Quake 2 online I heard about people tweaking their field of view settings so they could see more. This pissed me off, and it's only slightly less irritating than people using wall hacks in CS. Obviously the majority of gamers and developers agreed, as field of view is now locked in most first person shooters. It's also why Raven, arguably the best FPS game developer IMO, won't be supporting surround gaming. Now, I know you're going to bring up the old cable versus dial-up, slow versus high framerate argument, but I see these as limitations of gaming on a platform that can take form in innumerable configurations. While surround gaming was sort of cool, I wasn't impressed enough to consider buying three monitors and a Parhelia so I could game this way. I'd much rather buy a cheapo projector for six grand. I'd go as far as to say that gaming with three monitors was totally overwhelming, considering the hype. Three monitors could be ideal for productivity applications, but is it worth forking out a grand for a video card that supports this, when you can get a decent dual monitor video card for a couple of hundred bucks? Methinks not. To sum it up, I think surround gaming is an expensive gimmick for cheats.

JG: Oops, I forgot the purveyors of your favourite game of all time, Star Trek Elite Force. Matrox is incredibly pleased with the

number of developers that want to support surround gaming, including Raven. It's interesting that you see triplehead as cheating, considering your continued push for VR in gaming. Decent VR needs to take account of peripheral vision, which is what increased FOV and surround gaming do. At the moment a decent non-stereoscopic VR headset costs \$7000 odd bucks, a decent triplehead setup using three 19in FD Trinitron CRT screens would cost about \$3000. It is not as all encompassing as VR, but it delivers the same enhanced gaming experience. Would playing an online shooter with a VR headset be considered cheating? In my opinion both VR headsets and triplehead are enhancements of gameplay rather than cheating like wallhacks or see-through-walls drivers. And what about single player, which still far outweighs multiplayer in terms of popularity? It's interesting that Epic is being so proactive in showing off the triplehead features of UT2003 at E3 and CPL if it is considered cheating. Sure, we have a major difference of opinion on this, but this issue aside, the world does not stop and start with Shooters, and 3D is becoming commonplace in other genres.

BR: I agree with you 100% that VR would also be considered cheating, if indeed it presented you with a wider field of view. And please don't say another bad thing about VR, or you'll make me cry. You know how much I dream about it. . . I can admit that some people might dig surround gaming – but I didn't. Being a flight sim fan I thought I'd appreciate it when we ran MSFS2002, yet I left the room with shattered expectations. That pretty much sums up my feelings about Parhelia: I wanted it to be the next big thing, but it doesn't even come close. Maybe if it was released a year ago, or at half the price it's selling for today, I'd be impressed. But it's wasn't, and it's not; however, it's definitely a start for Matrox. Who knows where it'll be two or three generations down the road. . .



Atomic Benchmarks

The way we do the things we do.

Here at *Atomic* it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something that we take very seriously in the *Atomic* Labs.

SYSmark2002

SYSmark is a product of the collaboration between industry group BAPCo (www.bapco.com) and MadOnion.com (www.madonion.com). It is one of the next-generation application benchmarks and is designed to more accurately replicate the day-to-day workload that a system is subjected to. The benchmark focuses on Internet Content Creation and Office Productivity tasks in order to generate a final rating.

SiSoftware Sandra 2002 Professional

Sandra, from SiSoftware (www.sisoftware.co.uk), is a comprehensive benchmark and diagnostics utility. It contains dozens of special module applets that retrieve detailed information about the specifications and settings of a system, by polling each component's built-in firmware or BIOS. Sandra also features

a small suite of synthetic benchmarks for specific components such as CPU, memory, CD-ROM and hard disk. It also features a burn-in wizard for stress-testing overclocked systems.

3DMark2001SE Pro

3DMark2001SE Pro from MadOnion.com is the next progression of the popular benchmark utility. It also uses the MAX-FX engine and heavily emphasises DirectX 8.1 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Serious Sam: SE

Serious Sam: The Second Encounter is used for testing OpenGL performance. For game tests we use the Cooperative demo, which outputs an average framerate trimmed of excessive peaks. It also contains a fillrate test, which outputs fillrates for various texturing methods and is useful for comparisons between video chipsets.

HSF testing

To test HSFs, we use our Athlon XP test bed, which uses an internal temperature diode. SiSoft Sandra 2002 is run in looping burn in mode, with both CPU tests selected for 30 minutes before the load temperature is

recorded. The CPU is then left to idle for 30 minutes before the idle temperature is taken.

Quake 3: Arena *AtomicMPC* Demo

Quake 3: Arena (Q3A), from id Software, is the very popular first person shooter representing widely used OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, and are not representative of the worst conditions that the game can offer to a graphics card. So we developed our own *AtomicMPC* Demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, memory performance or a particular facet of 3D like T&L. For these specific purposes we can draw on a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Dronez, MDK2, or Adaptec ThreadMark. We also use a Lian Li temperature probe from Anyware (www.anyware.com.au) for tests that involve the measurement of temperatures, such as HD heatsinks. □

Atomic testbench specs

Both systems are running Windows XP Professional with DirectX 8.1, as well as the latest official NVIDIA drivers.

- AMD Athlon XP 1800+ system – ASUS A7V266-E motherboard (supplied by CASSA: www.cassa.com.au)
- Intel Pentium 4 2GHz – ABIT BD7II-RAID motherboard (supplied by ABIT: www.abit.com.tw)

Common components

- Samsung 256MB PC2700 DDR RAM (supplied by CASSA)
- Samsung 256MB PC800 RDRAM (supplied by CASSA)
- Hercules Prophet II GTS 32MB (supplied by Guillemot: <http://au.hercules.com>)
- 20GB Ultra DMA/100 7,200rpm hard disk drive
- Hercules Prophet II GTS 32MB (Supplied by Guillemot: www.hercules.com)
- Sound Blaster Live! Player (Supplied by Creative Labs Australia: www.creaf.com)
- ASUS 52X CD-ROM (supplied by CASSA)
- Belkin PCI FireWire card (supplied by Belkin: www.belkin.com.au)
- Belkin PCI USB 2.0 card (supplied by Belkin)

Benchmark settings

3DMark2001SE Pro

- 1,024 x 768, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,024 x 768, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer

Quake 3: Arena *AtomicMPC* Demo

All tests use Quake 3 1.27g and our custom Q3A demo recorded by the *Atomic* staff

- CPU testing: 320 x 240, maximum geometry detail, minimum graphics settings, high sound quality
- Graphics cards: Low quality = 1,024 x 768, normal quality graphics settings, sound disabled
- Medium = 1,280 x 1,024, maximum graphics settings, with all game sound disabled
- High = 1,600 x 1,200, maximum graphics settings, sound disabled



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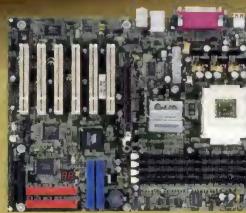


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- Supports 10/100Mb LAN connection
- ATX Form Factor



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EPoX

Framerate

Video cards come on all sorts of multi-coloured PCBs, with a crazy variety of Heatsinks and Ramsinks onboard. But in the end, performance comes down to what lies underneath. Here is your chance to how each card compares.

It has been a quiet month on the CPU front, as AMD irons out problems with the Thoroughbred cored Athlon and Intel prepares for a dash to 3GHz before Christmas.

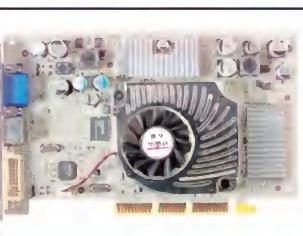
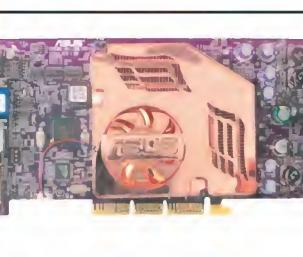
When it comes to 3D, the current favourite is the GeForce4 Ti4200 chipset as it delivers amazing performance at a fraction of the cost of the high end GeForce4 Ti4600. NVIDIA is shipping bucketloads of these chips, and as this months Framerate shows, everyone is leaping onboard the 4200 wagon.

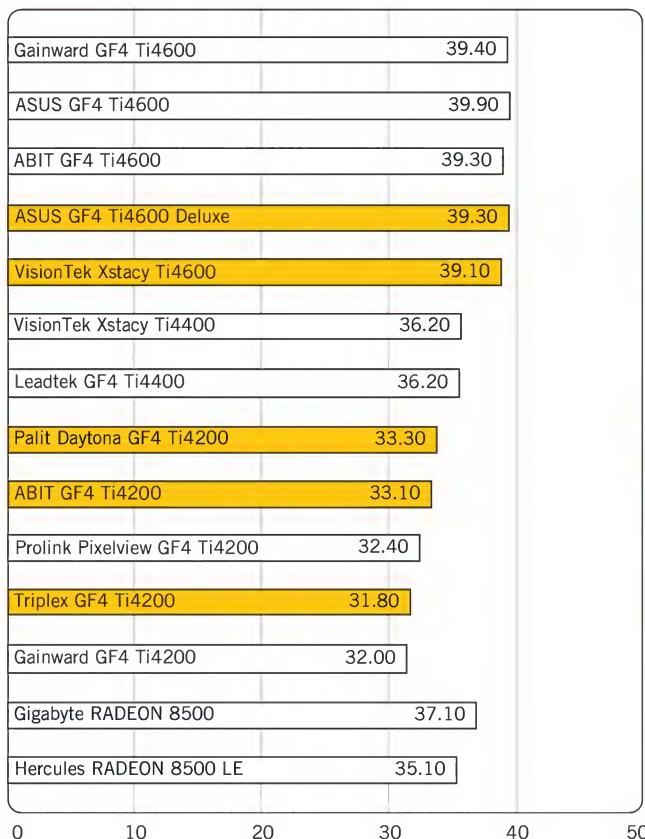
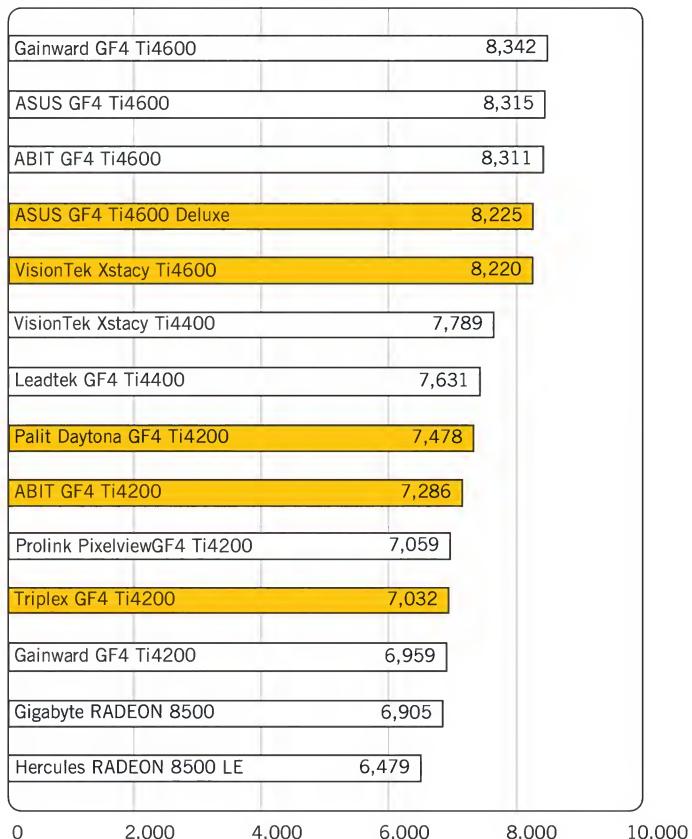
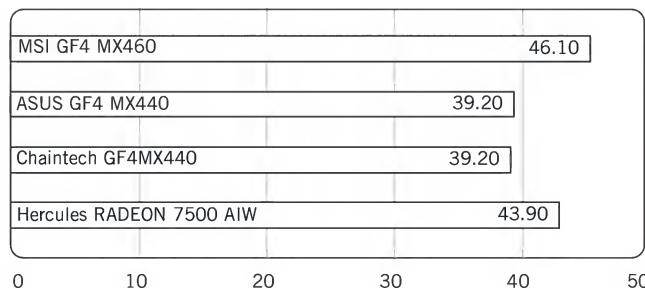
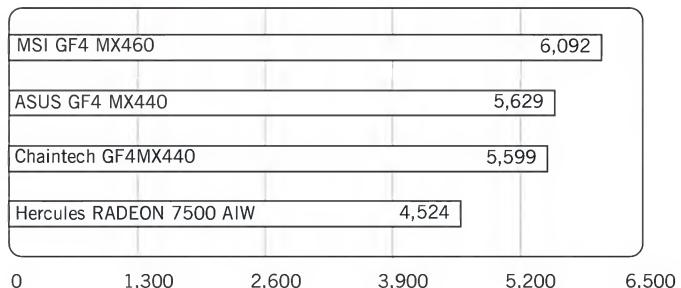
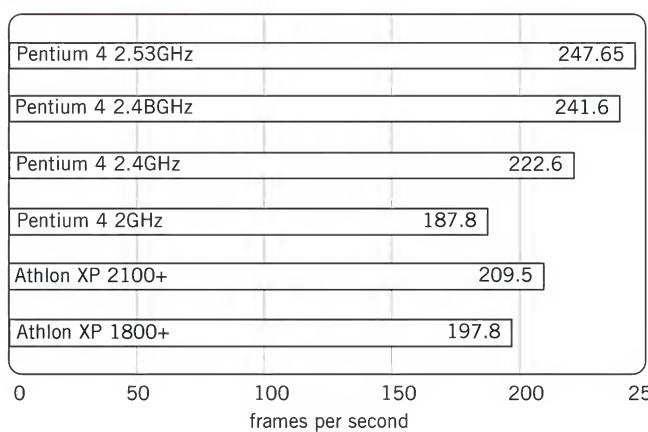
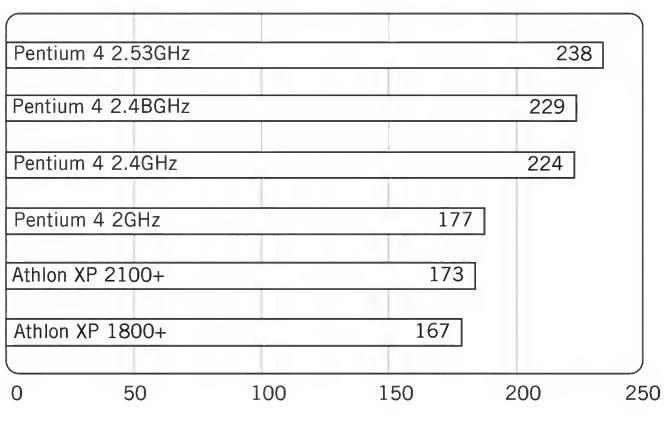
Next month we expect to see a strong showing in the budget

end from cards using the RADEON 9000 and 9000 Pro chipsets, as well as more companies using the SiS Xabre400 chipset at the ultra cheap end of the market.

The high end RADEON 9700 is still a month or two away, as is the NVIDIA NV30, which is still a long way from going into production.

As these shifts occur, the range will become more complicated and we will keep you abreast of the prices and relative performance right here in Framerate.

	<p>ABIT Siluro GeForce4 Ti4200</p> <p>Specifications: NVIDIA GeForce4 Ti4200, 64MB DDR RAM, TV Out, D-Sub, DVI Core speed: 250MHz Memory speed: 500MHz Website: ABIT www.abit.com.tw Supplier: Synnex www.synnex.com.au Price: \$379</p>
	<p>Triplex GeForce4 Ti4200 128MB</p> <p>Specifications: NVIDIA GeForce4 Ti4200, 128MB DDR RAM, TV Out, D-Sub, DVI Core speed: 250MHz Memory speed: 444MHz Website: Triplex www.triplex.com.tw Supplier: Oxygen Technology www.oxygen.net.au Price: \$412</p>
	<p>Palit Daytona GeForce4 Ti4200 128MB</p> <p>Specifications: NVIDIA GeForce4 Ti4200, 128MB DDR RAM, TV Out, D-Sub, DVI Core speed: 250MHz Memory speed: 444MHz Website: Palit www.palit.com.tw Supplier: Sato www.satotech.com.au Price: \$358</p>
	<p>VisionTek Xstacy GeForce4 Ti4600</p> <p>Specifications: NVIDIA GeForce4 Ti4600, 128MB DDR RAM, TV Out, D-Sub, DVI Core speed: 300MHz Memory speed: 6000MHz Website: VisionTek www.visiontek.com Supplier: Innovision www.innovision.com.au Price: \$999</p>
	<p>ASUS GeForce4 Ti4600 Deluxe</p> <p>Specifications: NVIDIA GeForce4 Ti4600, 128MB DDR RAM, TV Out, D-Sub, DVI Core speed: 300MHz Memory speed: 600MHz Website: ASUS www.asus.com.tw Supplier: CASSA www.cassa.com.au Price: \$889</p>

Serious Sam SE – 1,280 x 1,024**3DMark2001 SE – 1,280 x 1,024****Serious Sam SE – 1,024 x 768****3DMark2001 SE – 1,024 x 768****Quake 3: Arena****SYSmark2002**

I-Glasses

Has Bennett Ring finally uncovered the Holy Grail of Head Mounted Displays?



One of the huge barriers to true Virtual Reality becoming available to the masses has been the processing power needed to churn out two separate images, one for the left eye and one for the right, as well as the power needed to drive the motion-tracking unit. However, in this day and age of 2.5GHz CPUs and GeForce4s, we now have the processing power to make VR a reality, with a little left over on the side for ripping movies to DivX files or CDs to MP3. With motion trackers such as the TrackIR now selling for less than \$300, the problem of accurate motion input also seems to have been solved. However, there is one last hurdle that

stands between VR nirvana and us: the Head Mounted Display (HMD). Can the I-Glasses finally bridge this last remaining barrier?

In the past, one of the main problems with HMDs has been the weight of the unit. Anything strapped to your head doesn't need to weigh much before extended use causes a 'neck snapping like a twig' feeling. The I-Glasses weigh in at a very light 200g, making them among the lighter HMDs available, yet after prolonged use they still feel quite heavy. However, it's not your neck that bares the brunt of the load, instead you'll notice an aching forehead, as this is where most of the weight is supported. When you consider that the average human head weighs in at around 6.4kg, we're confident that you'll soon become quite comfortable with extended use of the I-Glasses.

The resolution of the two LCD monitors, one for each eye, has also been a problem in the past for HMDs. When your monitor is only a couple of centimetres wide, it's quite difficult to display a resolution high enough so that it will compare favourably with your average desktop monitor. However, at 800 x 600, the LCDs in the I-Glasses present you with a very crisp and clear image.

You might not think that 800 x 600 is a very high resolution, and it certainly isn't when viewed up close. However, the image that is presented to you by the I-Glasses appears to be hanging in front of your face over

13 feet away – at this distance there is no visible pixelation whatsoever. Most impressive!

This 'virtual' screen is by no means small, appearing to be 76" in diameter; however, because the eyepieces sit relatively far away from your eyes when compared to other HMDs, there is a large area around the screen where the horrible real world shows. It would have been a nice touch if this unit had a shroud around the edges of the screens to block this off, but using the goggles in the dark turned out to be an acceptable solution.

Considering just how close the screens are to your eyes, a high refresh rate is very desirable to stop screen flicker, otherwise intense headaches or the urge to puke are just around the corner. Thankfully the I-Glasses are quite happy to work at a refresh rate of 120Hz, which provides you with a very solid image.

We tested this unit with our favourite flight sim, IL2, as well as America's Army. The I-Glasses don't include motion-tracking functionality, so we hooked up a TrackIR unit for this purpose.

Flying IL2 turned out to be an amazing experience, being easily the best VR encounter we've ever had. Although when you consider how crappy every prior VR experience we've had has been, this isn't saying much. For the first time ever

'Considering just how close the screens are to your eyes, a high refresh rate is very desirable to stop screen flicker, otherwise intense headaches or the urge to puke are just around the corner.'

VR was actually very playable, and it added to the gaming experience rather than making it a Virtual Nightmare. America's Army wasn't as rewarding due to the accuracy needed for aiming, the TrackIR wasn't quite up to the job, and the slightly lower detail of the LCDs when compared to a CRT gave the I-Glasses user a distinct disadvantage.

A couple of problems did stand out about this HMD. First up was the appearance of a column pattern among the pixels, which seemed to get noticeably worse over time as the HMD got hotter. But even at the worst of times this wasn't a showstopper of a problem. The other problem was the pixel refresh time of the LCDs – turning our head rapidly resulted in a stuttering effect.

If you're a hardcore simulation fan, who happens to play games that use virtual cockpits, this could well be the HMD you've been holding out for, especially considering the reasonably affordable pricing.

They're still not quite perfect, but we can't wait to see what the next generation has to offer.

SPECIFICATIONS

200 grams; 800 x 600 LCD screens; stereo headphones built in.

Website: I/O Display Systems www.i-glasses.com

Supplier: Direct2u www.direct2u.com.au

Phone: Direct2u (07) 5455 3564 **Price:** \$1,500

7
10



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ASUS CRW-4816A

John Gillooly surveys the terrain from high on the slopes of Mount-Rainier.



CD write speeds just get faster and faster. For the past year it seems that every month brings with it a new speed boost, with model numbers ticking over almost as quickly as the hit counter on a free prOn website.

But those two little numbers in the middle of most model names, the rewrite speed ones, have been stuck on 10 for a long time. This is due to the limitations inherent in the normal CD Rewriteable format, which has prevented this infinitely more beneficial format from becoming mainstream.

After all who wants to wait half an hour to fill a rewriteable CD, when you could spend two or three minutes doing the same thing on a CD-R?

Salvation for CD-RW comes in the new format CD-MRW. This format also goes by the codename Mount-Rainier and

can expect those wacky open source nuts to incorporate support into Linux before that point, especially considering that Mount-Rainier has been developed as an open standard, and even though Microsoft is involved.

For now, support comes via packet writing software applications, the latest versions of which will support CD-MRW disks.

Our first look at CD-MRW comes in the form of the ASUS CRW-4816A. As well as being a burner capable of warp speed 48x writing, it supports 16x rewriting as well, and has full support for CD-MRW. For buffer-underrun protection it uses ASUS' FlextraLink technology and a 2MB buffer. It also includes a technology called FlextraSpeed, which is used to determine the optimal burn speed based upon the CD media used.

Like most recent burners it includes support for new modes like RAW DAO 96.

We tested the read and write speeds using Nero CDSpeed99 (www.cdspeed2000.com) and the CD-MRW support using Software Architect's Write-CDRW 3.0 (www.softarch.com), which is one of the few packages that currently supports CD-MRW.

Our write tests show the ASUS CRW-4816A performing at a peak 48x write and averaging 38x using P-CAV technology.

'Mount Rainier is a collaborative effort spearheaded by Philips, Microsoft, Compaq and Sony with the eventual aim of making CD-RW OS-Transparent and as easy to use as a floppy disk.'

it is a collaborative effort spearheaded by Philips, Microsoft, Compaq and Sony with the eventual aim of making CD-RW OS-Transparent and as easy to use as a floppy disk. This is achieved through the use of non-sequential data transfers, inbuilt defect management and a progressive formatting scheme.

CD-MRW uses UDF data format and is designed to be compatible across multiple platforms. Conceptually the easiest way to think of this technology is an enhanced version of what current packet writing software packages like Ahead's In-CD and Roxio's DirectCD can achieve.

When a disk is first loaded into the drive, it begins to format, even as data is written to the disk. If any defects are found with the disk while writing the data area is 'blocked off' and the data is transparently moved to a safe area of the disk.

If you need to eject the disk before it is completely formatted then after a slight pause the format will halt and you can remove the disk, ready for the format to finish in the background next time you load it.

This will naturally translate to slightly slower transfer speeds while the format happens, but once formatted the disk will perform at full speed.

The catch is that full native OS support for Mount-Rainier will probably not appear until Microsoft unleashes its next generation OS, codenamed Longhorn. Of course we

Our tests of the CD-MRW performance were more subjective as CDSpeed does not support benchmarking of this technology yet. Performance is quicker than standard burning; however support is still very similar to traditional packet writing. Once formatted the disk then runs like a normal rewriteable drive, with slow writes, fast reads and instant deletes.

It's still a long way from performing at the same lightning speeds that CD-R can currently attain.

ASUS is one of the first out on the slopes of Mount-Rainier, and the support for the format is definitely welcome. However the fields will soon be crammed with every man and his dog (where man = CD burner manufacturer and dog = buffer underrun technology), even though the ski season doesn't really start until the release of Longhorn.

It's good to be prepared, and that is what ASUS provides with the CRW-4816A, with CD-MRW nestling nicely in a fast burner with all the trimmings.

SPECIFICATIONS

48x Write; 16x Rewrite; 48x Read; Mount-Rainier support; RAW DAO 96 support.

Website: ASUS.com

Supplier: CASSA CASSA.com.au

Phone: CASSA (07) 5445 2992 **Price:** \$219

8/10

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scorbett@atomicmpc.com.au. We'll take it from there.**

atomic
MAXIMUM POWER COMPUTING

S-MEDIA RADEON 9000 PRO

DirectX 8 functionality is great, chimes Bennett Ring, but you'll need performance to match.



One of the biggest complaints about the GeForce4 MX series was the branding NVIDIA used. By calling the series GeForce4, many assumed that these mainstream video cards carried the full DirectX 8 compliance of the true GeForce4s. Uh uh. Unfortunately the GeForce4 MX only had a Vertex shader [v1.1 limited], and lacked any form of pixel shader, which is necessary for true DirectX 8 compliance.

Now that ATI's RADEON 9000 has arrived, mainstream buyers can get a real DX 8 card without having to fork out the premium price of a GeForce4 or RADEON 8500. There are currently two versions of the RADEON 9000, both of which use the swanky new ATI RV250 graphics processor. Both of these flavours are identical other than the core and memory speeds; the RADEON 9000 has a core speed of 250MHz paired up with 200MHz DDR-RAM [effectively 400MHz], while the RADEON 9000 PRO has a slightly speedier 270MHz core accompanied by significantly faster 275MHz DDR-RAM [effectively 550MHz].

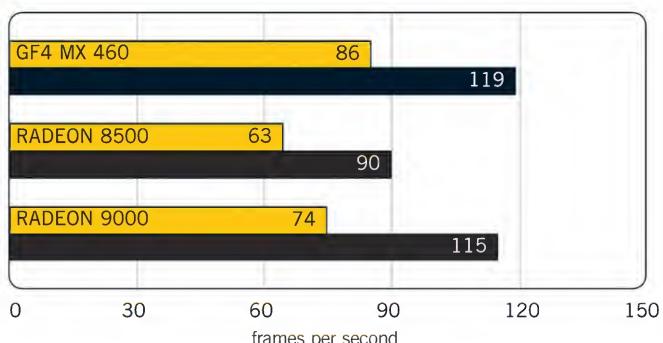
The RV250 is functionally identical to the R200 (used in the RADEON 8500), with one major exception: to cut the cost of the RV250, ATI has removed one of the two texture mapping units [TMUs] for each of the four pixel pipelines. ATI has also endowed the RV250 with FULLSTREAM technology. This is a pixel shader program that is applied to streaming video, and helps to remove the blocky look that most streaming video suffers from. Instead it just looks blurry. Umm, cool.

To see how ATI's new mainstream beast fairs in today's jungle of GPU predators, we installed it into our standard Athlon testbench, and threw a handful of benchmarks at it. We also tested it against the RADEON 8500, as well as NVIDIA's current mainstream champion, the GeForce4 MX 460. First up was a test we thought would be appropriate for this DirectX 8 card—that-can – 3DMark2001SE. As the results suggest, the RADEON 9000 is slightly below the performance level of its predecessor, but at a fraction of the cost.

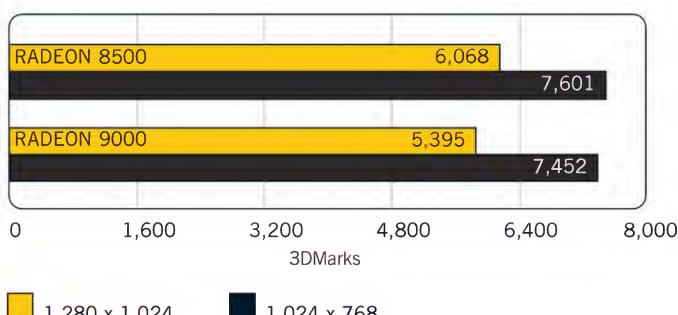
Next up was everybody's favourite OpenGL benchmark, Quake 3: Arena. While ATI has traditionally lagged behind NVIDIA's equivalents in this test, the RADEON 9000 goes a long way to closing this gap, falling in just behind the MX 460 at 1,024 x 768, and slipping a little further behind at 1,280 x 1,024.

The final test was the Serious Sam SE co-op demo, running at quality video settings with 32bpp colour and textures. Unlike the Q3:A test, the RADEON 9000 PRO literally thrashed the MX

Quake3: Arena *Atomic* demo



3DMark2001SE



460, as well as the RADEON 8500, by at least 35% regardless of the settings used. And we don't have a bloody clue why. On paper, the RADEON 9000 should perform on par with the RADEON 8500, so we're guessing that Serious Sam SE didn't autodetect the RADEON 9000 PRO correctly, and thus ran the tests at lower video settings than it should have, although it did appear to be running at the full quality video settings. Due to this inconsistency, we decided not to publish the SS results.

New architectures tend to overclock well, but this isn't true for the RADEON 9000 PRO. We managed to squeeze an extra 9% out of both the memory and the core, increasing both to 300MHz – a marginal increase at best.

It appears that the RADEON 9000 PRO performs around the same level as the ageing NVIDIA GeForce4 MX 460 design, but brings full DirectX 8 compliance to the bargaining table. However, by the time most games make the most of DirectX 8 functionality, it's likely that the RADEON 9000 PRO isn't going to have the grunt to run these super schmick game engines at anything near a playable frame rate. Perhaps the most promising aspect of having a mainstream DirectX 8 video card is that developers have more of an incentive to use DirectX 8 features within their programs.

SPECIFICATIONS

275MHz ATI RV250 GPU; 64MB 275MHz DDR-RAM, AGP 4X; dual 400MHz RAMDAC.

Website: S-MEDIA www.s-media.com.tw

Supplier: BlueChip InfoTech www.servex.com.au

Phone: BlueChip InfoTech (02) 8745 8400 **Price:** \$289

8/10

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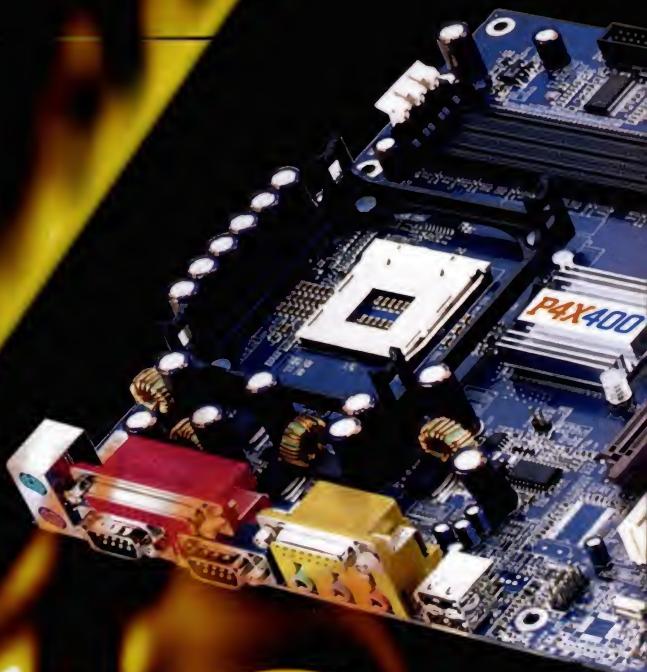
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NoiseControl Silverado



Aluminium is good at conducting heat. Silver is great. Gold is even better, apart from the fact that it melts into a pool of goop at a relatively low temperature. The Silverado is the first HSF we've seen to use silver, but you're probably wondering how on Earth could you afford an HSF constructed of silver? Well, unless you play polo on the

weekend and sip 40-year old port after each evening meal, you probably wouldn't invest in a totally silver HSF, but you could scrape together enough cash for an HSF with a silver baseplate.

Which is why the Silverado doesn't cost a couple of grand. While the heat dissipating fins on the Silverado are made from everyday Aluminium, only the base uses a silver insert to make contact with the CPU. This is polished to a high sheen, ensuring a snug fit with your burning block of heat. You'll notice that the fans (yes, we said fans, all two of them) are also out of the ordinary, as they're mounted vertically on top of the heatsink. These aren't the kind of fans that can be put to use on the side

to inflate hot air balloons, as they max out at a meagre 3,200rpm. As a result, they're pleasingly quiet, but not quite silent. If these fans were replaced with 6,000+rpm jobbies, this could've been one of the finest performers we've seen.

To test this skyscraper HSF (it's 11cm high), we attached it to our Athlon XP 1800+, which runs at 1533MHz, as well as the high performance FOP-38 for comparison, with an ambient temperature of 20°C for all tests. Load temperature on the Silverado reached 50°C, while the noisier FOP-38 peaked at 46°C. Idle temperatures were also slightly hotter than the FOP-38, with the Silverado reaching 45°C compared to the FOP-38's 41°C.

So it's obvious that this HSF isn't aimed at the high performance, uber-overclocking set. If it were, you'd probably hear it from interstate, considering it has two fans. No, this HSF aims to do a reasonable job of cooling with a minimum of noise, and succeeds in doing so. One more thing: that silver slug on the base of the heatsink obviously raises the cost of this unit – at \$120 this HSF certainly isn't cheap, but can you put a price on the loss of sanity caused by incessant whirring noises? □

SPECIFICATIONS

Two 3,200rpm fans with speed adjustors; Aluminium heatsink with silver insert.

Website: NoiseControl www.noisecontrol.de

Supplier: Quiet Computer Systems www.quietcomputers.com.au

Phone: Quiet Computer Systems (07) 5543 1945 **Price:** \$120

7.5/10

Sony Linux PS2 kit



Just when you thought Linux was contained in that i86, ia64, Sparc, Alpha, PowerPC, ARM, SGI, IBM S/390, Motorola 68k and embedded architecture base (did I miss any?), someone went ahead and ported the MIPS version to the PS2. That someone was Sony.

The kit sells for \$499.95 and comes with a 40GB Maxtor hard drive, Sony 10/100 network adaptor, USB Keyboard and mouse, monitor and audio adaptor, and two DVDs with version 1.0 of Sony's PS2 Linux. You will need to supply your own sync-on-green monitor (most are anyway) and 8MB memory card. The distribution is based on RedHat and comes with everything you'd expect with a Linux distribution, from the Apache Webserver and Samba through to The Gimp image manipulation software and the

KDE/Gnome desktops. More important, is the comprehensive documentation, example source, and new APIs provided with the kit to help developers make full use of the PS2's capabilities.

Once installed it looks and performs just like any other Linux system, only a little slower – with only 32MB onboard the PS2, the swap will see service if you start gunning up the GUI.

But why Linux on the PS2? Perhaps Sony has plans for the future. Should the already quite active developer community write and port code to the PS2 such that it becomes a versatile, fully-featured, and cheap computing platform then Sony will, by and large, sell a boatload more PS2s. With Linux as an OS the PS2 could easily become an affordable all-in-one Internet connected home entertainment unit. A market, funny enough, that Microsoft is targeting. It's a good move, because people will hack and mod and reprogram anyway. You can fight it, like Microsoft is, and stunt the growth of your product or support it, like Sony, and secure more sales and a larger install base for your hardware.

The kit is certainly aimed at a niche market, but it definitely adds to the cool factor of your funky PS2 (if only for that sleek black keyboard alone). □

SPECIFICATIONS

40G Maxtor HDD; 10/100 Ethernet; styled black USB k/b, mouse; monitor/audio adaptor; 2 PS2 Linux 1.0 DVDs.

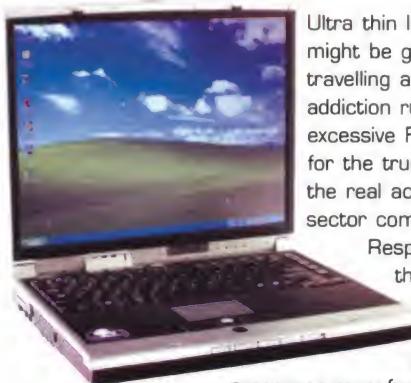
Website: Developer community www.playstation2-linux.com

Supplier: Sony Australia www.sony.com.au

Phone: Sony Australia 1300 365 911 **Price:** \$499.95

7.5/10

ASUS L2000B



Ultra thin lightweight notebooks might be great if you're really into travelling a lot and your gaming addiction runs as far as some excessive FreeCell sessions, but for the true performance freak, the real action in the notebook sector comes at the chunky end.

Respectable performance in the chunkier notebooks is thanks to concerted efforts by graphics chipmakers,

processor manufacturers, hard disk makers and the notebook manufacturers themselves. They now pack enough performance to rival desktop systems in some classes and now the until-recently novelty of using a notebook for LAN gaming or DVD watching is a very viable option.

ASUS' new L2000B series of notebooks packs some of the latest tech into a relatively small package. The two standouts are a 2GHz Pentium 4-M CPU and a 5,400rpm IBM hard drive. Now we all know that 5,400rpm HDDs are very 1990s in terms of desktop technology, but when it comes to notebooks this is a very recent revolution as concerns about durability at high rotation speeds are utmost in the minds of designers.

Until now, the vast majority of notebook hard drives have run

at 4,200rpm. The L2000B's 5,400rpm hard drive combined with the 2GHz P4 delivers some impressive benchmark results: we tested the notebook using SYSmark2002 and compared it to a Dell 2GHz machine with double the RAM – and the ASUS beat it by a small margin. In Quake 3: Arena the results were much closer, but when disk access is an issue 5,400rpm really helps.

Perhaps the most curious factor with the L2000B is that it includes the ability to adjust the CPU's FSB in the BIOS, which we couldn't resist tinkering with. Unfortunately the inherent cooling needs of the notebook mean that while small overclocks work, anything serious results in the thermal protection kicking in on the P4 and performance throttling back to 1.28GHz, and unfortunately this cannot be overridden.

While the older ATI mobility M6 graphics core means that the L2000B is not a big performer in the gaming sense, it is a great all round performance machine.

It isn't time to replace our beloved desktop beasts, but notebooks are starting to become serious contenders for the performance crown.

8/10

SPECIFICATIONS

2GHz Pentium 4-M; 256MB DDR RAM; 20GB 5,200rpm HDD, ATI M6 graphics.

Website: ASUS www.asus.com

Supplier: CASSA www.cassa.com.au

Phone: CASSA (07) 5445 2992 **Price:** \$4,999

atomic
HOT

VideoLogic ZXR-500 5.1 Speaker System



With five 3" satellites of 8W RMS each, and a 5" subwoofer of 25W RMS, the ZXR-500 speaker system doesn't seem anything special on paper. We were somewhat surprised then, at the ear candy we were treated to.

Although it features DTS, Dolby Digital and Pro Logic compatibility, this system is a perfect example of why, if you want the best possible sound, that proper speaker placement is just as important as the specs themselves. When we first pumped some Rammstein through this set in a non-optimised configuration the mid to upper ranges were loud and clear, but the sound was dismally let down in terms of bass response. Now in theory, frequencies below 80Hz are non-directional, but in reality, the best thing you can do for many subwoofers is to position them in a corner. Once we did this, we were blown

away with a rich, pumping, solid bass, balanced nicely by clear and sharp responses across the sound spectrum.

Although they're built inside moulded plastic housings, the satellites are rugged and heavy, and while they come supplied with stands, they're not wall mountable, which is a little disappointing. The subwoofer is constructed from a solid wooden cabinet and is as solid and sturdy as you would expect a decent sub to be. The front and side bass ports are flared, rather than cylindrical, a form which allegedly improves sound quality.

It's normal for speaker controls to be placed on the subwoofer and VideoLogic continues this standard, however in the absence of a remote control, this is often an awkward solution, as subwoofers are mostly positioned in places that aren't within easy reach. There is no master volume control – instead, there are four front mounted volume dials, for left, right, center and bass, and any further sound control would need to be done through your soundcard.

VideoLogic's impressive offering is priced at the higher end of the PC speaker market (but at the low end of entertainment systems), and the sound is sure not to disappoint.

9/10

SPECIFICATIONS

Fronts, rears and centre 8W RMS each; subwoofer 25W.

RMS; Frequency response: Amplifier < 20Hz to 20kHz

Website: Videologic www.videologic.com

Supplier: Syslink www.videologic.com

Phone: Syslink (03) 97222089 **Price:** \$250

Intel Celeron 1.7GHz

Bennett Ring has now definitely turned to the dark side.



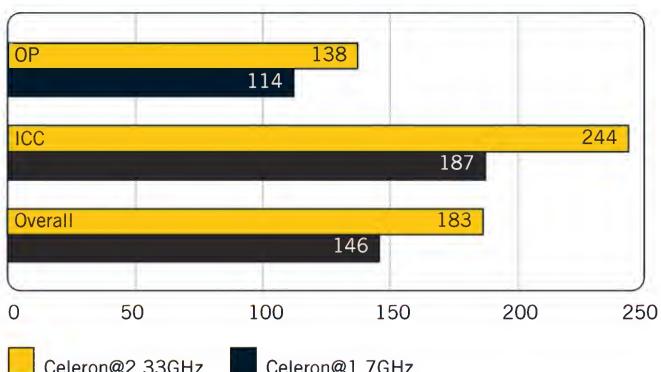
If you want to hobble a CPU, lowering the front side bus is good, but halving the L2 cache is better. This is especially true when the CPU relies on L2 cache to improve performance – in this case, the Pentium 4. The new Celeron has suffered the indignity of both of these crippling procedures to increase the gap between it and the Pentium 4, in performance and price.

As we saw with the release of the 512KB L2 cached Northwood core, the P4 gets a decent shot in the arm when its amount of L2 cache is increased, but this comes at a cost – literally the cost of the CPU – because extra transistors aren't free. It's only natural that Intel's budget chip has a smaller amount of L2 cache than the P4. While it's based on the P4 Willamette core, which originally shipped with 256KB of L2 cache, the new Celeron has a meagre 128KB.

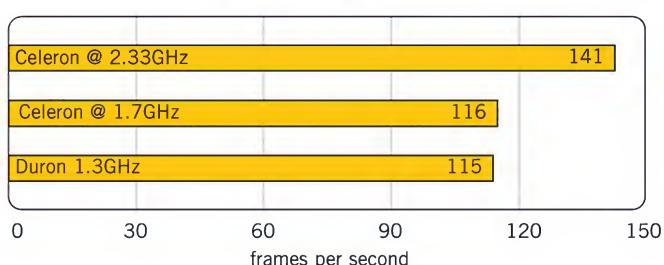
While lowering the amount of L2 cache can keep the price down, lowering the FSB cannot. The move to a 100MHz FSB, as opposed to the 133MHz FSB used by new P4s, doesn't save Intel any production costs, yet it accentuates the performance difference between the Celeron and its big bro. It wouldn't help Intel's profit margins if its Honda Civic performed almost as well as its Ferrari F50. However, due to the quad pumped nature of its FSB, the Celeron effectively runs on a 400MHz FSB, thereby reducing the performance hit earlier Celerons suffered from. The new Celeron is basically a Pentium 4, although its clock speed of 1.7GHz is much lower than the current Speedy Gonzales of the P4 line, which clocks in at a whopping 2.53GHz.

We were very interested to see how far we could push this CPU – after all, it was the original Celeron 300A that took overclocking mainstream. Considering this Celeron is a crippled 0.18-micron Willamette core, we estimated a speed of around 2GHz would be possible. So the final stable speed of 2.33GHz using the standard Intel HSF was a pleasant surprise, as it equated to a 37% speed increase – the FSB was running at 137MHz (effectively 548MHz), removing the FSB difference between the Celeron and the new P4. It must be remembered that we achieved this result with a single engineering sample CPU, so you might find other Celerons don't do

SYMark2002



Quake 3: Atomic Demo – Series 1



as well, although the online overclocking community mostly concurs with our results. We plugged the new Celeron into our standard Intel testbench for a thorough benchmark workout. Could this be the Celeron that finally sheds the 'Celeron=Useless P.O.S.' reputation the Duron helped to establish?

At its default speed, the Celeron scored a very average 146 points in BAPCo SYMark 2002 but when overclocked it reached a remarkable 183. Considering that the Athlon XP 2200+ scored 180 in the same test (see *Issue 18*), it's hard not to be impressed.

Q3:A makes for an excellent CPU benchmark at the lowest resolution of 320 x 200, and using our CPU settings, the Celeron reached 116fps at default speed, increasing to 141fps when overclocked. Compare this to the 200+fps that slower full-blooded P4s reach, and it's obvious the large impact the lack of L2 cache has had on the performance of the Celeron. However, the fastest Duron at 1.3GHz only reaches 115fps in the same benchmark. Sadly for AMD, it appears that even in the budget market Intel now has a better performer, which happens to be more overclockable.

We used to have fun bagging Intel for its overpriced, under-performing CPUs, but now it appears we'll need to start aiming our attitude problems someplace else, as the new Celeron establishes itself as king of the budget block, alongside the P4's reign of performance champion.

□

SPECIFICATIONS

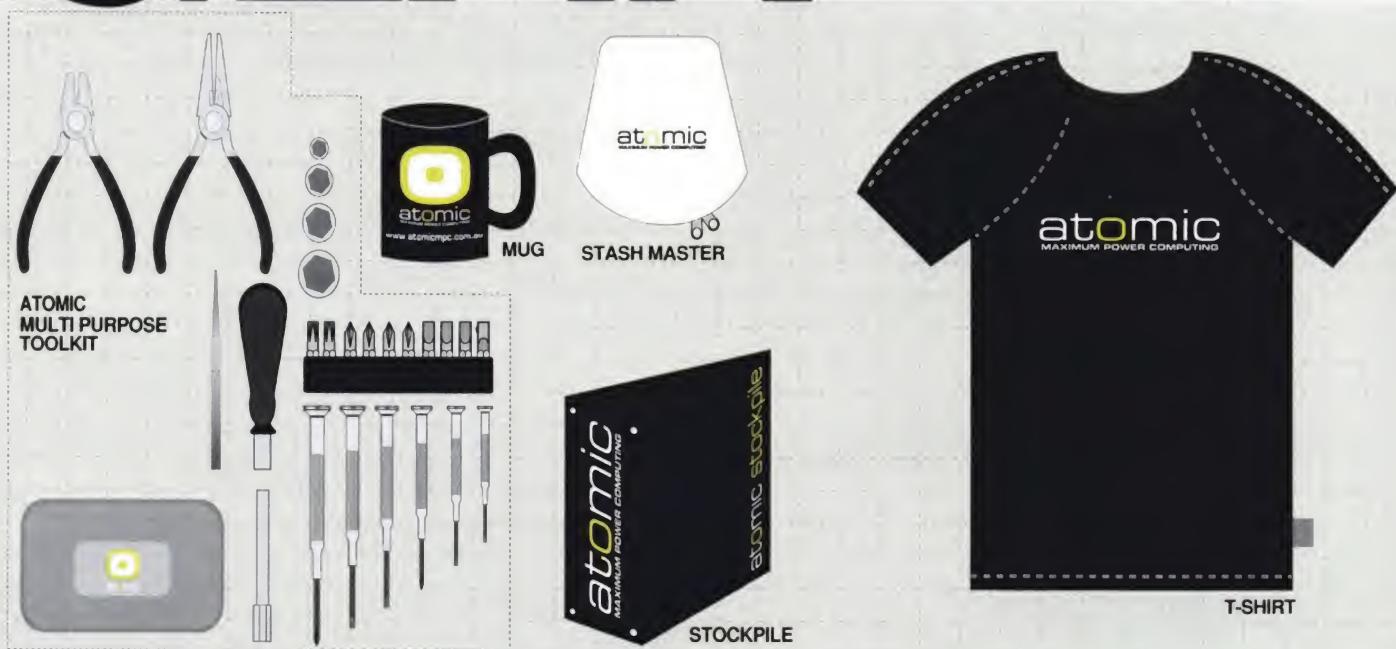
1.7V CPU Vcore; 100MHz FSB (quad pumped); 128KB L2 Cache; Willamette P4 core.

Website: Intel www.intel.com

Supplier: Altech www.altech.com.au

Phone: Altech (02) 9748 2233 **Price:** \$188

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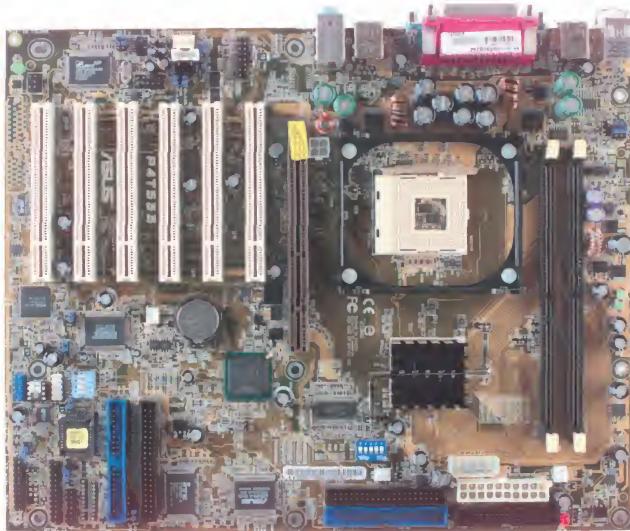
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ASUS P4T533

John Gillooly checks out some RIMMarkable new memory technology.



RDRAM has never really been seen as a viable option for the performance hungry, despite providing some of the best memory performance available.

The reasons for this have usually come down to three factors: it used to be prohibitively expensive; it narrows future upgrade paths; and the dual channel PC800 and PC1066 RDRAM that is paired with the Pentium 4 needs to be paired, meaning that upgrades are again restricted to multiples of the same memory amount at around double the cost of buying a single module.

In order to combat this, the memory manufacturing company everyone loves to hate, RAMBUS, has come up with the RIMM4200 refresh of RDRAM. This is not really a new technology, more a means of cramming two PC1066 RDRAM sticks onto a single RIMM module, thus eliminating the need for pairing of RDRAM.

The major advantage to this implementation is that there is no need for a new chipset to support it, with the majority of work falling upon motherboard designers rather than chipset manufacturers.

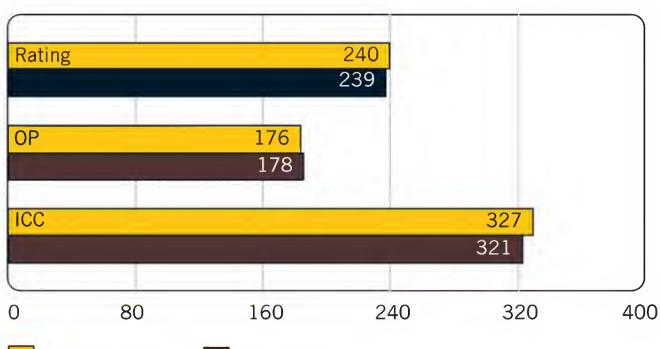
It works with the newly released Intel 850E chipset and is designed to be paired with the 533MHz FSB Pentium 4 processors. The first manufacturer on the market with a RIMM4200 supporting motherboard is ASUS, with the P4T533 motherboard.

This shouldn't be confused with the previously released P4T533-C version of the board that supports normal PC800 and PC1066 RDRAM.

As industry focus moves squarely towards DDR333 it seems that RDRAM has been given a low priority by memory manufacturers, evidenced by the fact that PC1066 RDRAM is still almost impossible to find. It's a trend that appears to be continuing with RIMM4200, hence the launch of the PC800 and PC1066 based motherboards before the expected RIMM4200 supporting ones.

Motherboards that supported PC800 and PC1066 RDRAM have always had four RIMM slots on the board, a number that is reduced to only two for RIMM4200 boards.

SYSmark2002



Quake 3: Arena – CPU



This has allowed ASUS to add more features to the board: it has six PCI slots rather than the five seen on the P4T533-C and also somehow finds enough space to add an IDE RAID controller.

We tested the P4T533 using 512MB of RIMM4200 RDRAM and a 2.4GHz 533FSB Pentium 4 CPU, and compared it to the P4T533-C running 512MB of PC800 RDRAM overclocked to PC1066 speed in SYSmark2002 and Quake 3: Arena using CPU settings.

The results are almost identical, as the variations between the two are more indicative of the small inherent variability within the benchmarks than any difference between the two boards.

These are still the fastest scores we have seen for the 2.4GHz 533FSB Pentium 4, and show that RDRAM is still the option for the performance buff.

If RDRAM is the road you want to go down, then RIMM4200 is the better option than PC1066 for the long term. The lack of the need to pair RAM and the increased real estate that comes from the reduced number of RIMM slots means that the P4T533 combines the best current performance with features that are lacking on some other i850E based motherboards.

The only real issue is that the actual memory is incredibly hard to find. O

SPECIFICATIONS

Intel 850E chipset; supports RIMM4200 RDRAM; two RIMM slots; six PCI slots; ATA133 RAID

Website: ASUS www.asus.com

Supplier: CASSA www.cassa.com.au

Phone: CASSA (07) 5445 2992 **Price:** \$679 w/256MB RAM

8.5/10

AOpen

TubeSound



AK77-333

AOpen JukeBox CD Player



AX4G Pro

AOpen JukeBox CD Player



MX46L



MX4LR



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- 5.1 Channel audio +USB2.0
- North Bridge Cooler
- Dr. Voice Debug function
- 1 MHz Stepping CPU Frequency

- Intel 845G support DDR333
- Support SKT478 400/533FSB
- Dr. Voice debug
- Realtek Lan onboard
- 5.1 Channel Audio, USB2.0
- 1Mhz FSB Stepping

- SIS 650GX+DDR266+FSB400
- ATA133
- Integrated VGA, AC97 Audio
- 4x AGP slot
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- Intel 845GL support DDR266
- Support SKT478 400FSB
- On-die Graphic + ADD slot
- Audio and LAN on board
- USB 2.0

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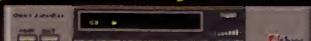
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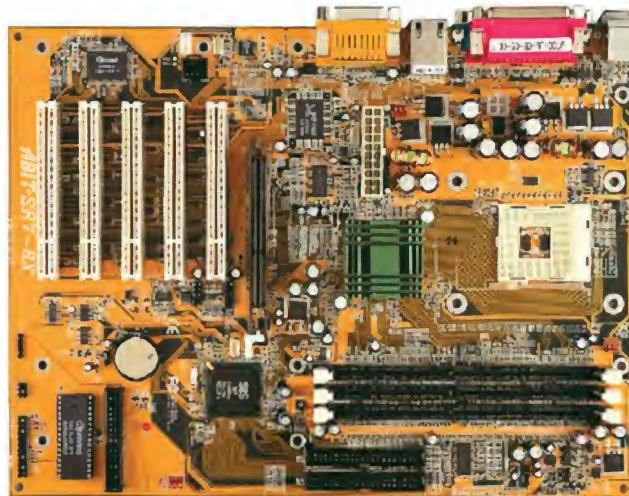
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ABIT SR7-8X

More Pentium 4 chipset loving comes flying our way and John Gillooly plays catch.



We can safely say that the first half of 2002 has belonged to the Pentium 4. Support for the Athlon bubbles along at a background level, but it seems every man and his mangy dog has launched a Pentium 4 chipset. Intel has spammed us with the i845D, i845E, i845G, i845GL and i850E, VIA has thrown in the P4X333, P4X266-E and the new P4X400, ATI has launched and then recalled its P4 Northbridge and SiS has given us the SiS645, SiS650, SiS645DX and now the SiS648.

As well as supplying enough alternating caps and number (ab)usage to please even the I337est of H4X00rs, it means that we are now spoilt beyond hope for choice when looking for a new mobo.

So it begs the question of why we should bother with the SiS648 when there are already so many other options?

The answer is a combination of speed and features: ABIT's SR7-8X may lack some of the high-end features seen on other ABIT boards, like IDE RAID, but it makes full use of the included features in the SiS648 chipset and even adds a little undocumented surprise to the mix.

While the SiS645DX was an interim solution that added support for the 533MHz FSB P4 to the existing SiS645 chipset, the SiS648 adds a massive swag of next generation features.

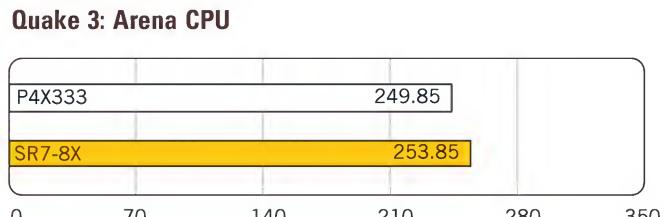
The major change to the SiS648 HMAC Northbridge chip is the inclusion of support for AGP 8x (hence the 8X in the motherboard name), the major changes come in the SiS693 MuTIOL 1G Media I/O Southbridge, with integrated USB 2.0, 10/100 Ethernet and IEEE1394 (unfortunately the IEEE1394 functions are not used by ABIT in the SR7-8X). These are hooked up using SiS' proprietary interconnect technology, dubbed MuTIOL 1G, to deliver 1.2GB/sec throughput between the chips.

As we started searching through the BIOS of the SR7-8X we noticed one other little feature: the ability to adjust the RAM speed to an effective 400MHz. So out of the *Atomic* safe came our precious stick of DDR400 RAM and into the board it went. The board booted and ran without a hitch (unlike the Athlon, where the 266MHz FSB speed negates a

SYSmark2002



Quake 3: Arena CPU



lot of the benefit of DDR333 and DDR400, the Pentium 4 has bandwidth to spare). We tested the SR7-8X using 256MB of DDR400 and compared it to a VPSD P4PB-U motherboard, which uses the VIA P4X333 chipset, with 256MB of DDR333. In our Pentium 4 chipset roundup in *Atomic 18*, the P4X333 simply blew away all the other DDR chipsets with its performance, so it provides a good yardstick for the performance of the SR7-8X.

In our Quake 3: Arena CPU tests the SR7-8X only just scraped ahead of the P4PB-U, however the score margin can be attributed to the inherent background fuzz in these particular benchmarks.

A similar picture appears in SYSmark2002 Pro as the SR7-8X manages a three per cent lead over the P4PB-U.

This is still some of the fastest Pentium 4 performance we have seen, without resorting to expensive and esoteric RDRAM, but it doesn't quite manage equity with the VIA P4X333 chipset, even though it is using faster RAM.

On the other hand, the SR7-8X delivers a very competitive featureset as well as providing an 8x AGP implementation that will actually work with the only AGP 8x chipset currently on the market, the SiS Xabre400 (VIA's AGP 8x implementation has problems with running the Xabre at AGP 8x).

It is a good cheap board, but there is nothing about it that truly dazzles.

SPECIFICATIONS

SiS648 Chipset; AGP 8x; DDR266,333 and 400 support; USB 2.0; five PCI Slots; three DIMM slots.

Website: ABIT www.abit.com.tw

Supplier: Synnex www.synnex.com.au

Phone: Synnex 1300 880 038 **Price:** \$229

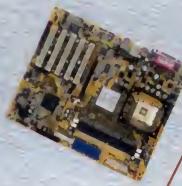
8/10

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- Supports 400 / 533 FSB Pentium 4 CPUs
- Supports (PC1600) DDR200/(PC2100) DDR266
- Overclocks to support DDR333
- 6 Channel Onboard Sound
- DFI's BitGuard Hardware Monitoring

**NB73-EA****Socket 478 / Pentium 4**

- Intel 845E Chipset
- Supports 400 / 533 FSB Pentium 4 CPUs
- Supports (PC1600) DDR200/(PC2100) DDR266
- Overclocks to support DDR333
- 6 Channel Onboard Sound
- DFI's BitGuard Hardware Monitoring

**NS70-TL****Socket 478 / Pentium 4**

- SiS 645DX Chipset
- Supports 400 / 533 FSB Pentium 4 CPUs
- 3 DDR DIMM slots / 5 PCI slots
- ATA133 Ready
- DFI's BitGuard Hardware Monitoring



BitGuard is a hardware monitoring system designed for DFI boards: diagnostic LEDs, Overclock AP, Watch Dog, CPU, AGP, fan and thermal protection.

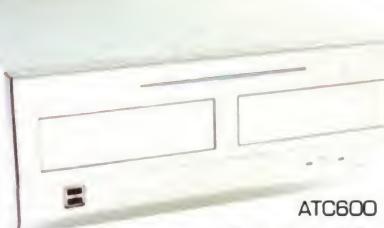

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Lian Li PC-9300



No, you're not reading the special Groundhog Day Edition of *Atomic*. This is not the Cooler Master

ATC600 case reviewed

last month, but you'd be hard pressed to tell the difference, until you glance at the price tag, which is nearly half that of the huge \$550 Club Cooler Master door fee.

It's also missing the acrylic door on the front that, depending on your tastes, results in a drop in visual appeal. But apart from this small difference these two cases are dead ringers.

The PC-9300 has two internal 5.25in drive bays, both of which are accessible from the front. Nestled cosily on top of these are two 3.5in internal drive bays, eagerly awaiting the insertion of a hard drive or two.

If you still use a floppy disk drive, in between chopping wood for the stove and taking out your night soil, the PC-9300 is more accommodating of your archaic needs than the ATC600, which didn't have a floppy bay at all. This is due to the included drive bay mount, which converts one of the front 5.25in drive bays into a 3.5in bay. If your CD or DVD drive facias happen to be of the beige persuasion, several Aluminium face plates are

included to increase your shininess quotient, which would normally sell for approximately \$50 alone.

Due to the small size of this case, you're only going to be able to squeeze a MicroATX motherboard into it, which isn't too much of a problem considering that these now include almost as many features as a full sized ATX mobo. More worrying is the fact that the case will only accommodate SFX form factor PSUs, which aren't the most powerful PSUs available, as they average around 150W. However, considering that you're probably going to use this case as the chassis for a simple DVD/MP3 player, you're unlikely to need the equivalent of a breeder reactor to provide the power. Two case fans are included at the rear, with a fan speed controller to tame them if they start getting a bit rowdy. While the price tag might seem fairly high when compared to your average midi-tower, it's a pittance when contrasted against its Cooler Master doppelganger.

If you're looking for a schwingen stylistical case with a minimal footprint, the Lian Li PC-9300 should fit the bill, without incurring a massive one in the process. □

SPECIFICATIONS

Aluminium MicroATX case; two case fans with speed control; Aluminium drive facias included.

Website: Lian Li www.lianli.com

Supplier: AusPC Market www.auspcmarket.com.au

Phone: AusPC Market (02) 9817 2899 **Price:** \$286

9/10

Thermaltake Hardcano 5



Unless you're running a SCSI drive, there really isn't much point in using a hard drive cooler. For

starters, your standard IDE drive doesn't generate so much heat that you can chuck a couple of prawns on it and invite some mates over. Secondly, they're now designed to handle being installed in a case that has the same air flow (nil squared) as you'll find on the surface of the moon.

Thankfully, the Hardcano 5 offers more than just a hard drive cooler. Namely a battery powered LCD temperature monitor with a single temperature probe, and a fan speed controller. The speed controller can be used with any fan in your PC, not just the titchy 40mm fan installed in the front of the Hardcano 5.

The 40mm fan spins at 5,000rpm when set to the highest speed, but still only manages to push 5cfm. When you compare this to the 80mm fans usually used within cases, which average around 30cfm, you'll soon realise just how weak the 40mm fan is. While the top part of the Hardcano 5 appears to be a heatsink, due to its finny appearance, it doesn't actually make contact with the hard drive, making these fins next to useless.

To test whether or not this contraption actually made a difference to hard drive temps, we strapped a couple of temperature probes onto the top centre and side of our

reference hard drive (the hottest external places on the drive chassis), before copying around 5GB of files from one partition to another partition on the drive. Temperatures were measured just before the file copy completed, and ambient temperature was a constant 17°C.

Without the Hardcano in place, the top centre reached 31°C while the side maxed out at 34°C. After inserting the hard drive into the Hardcano, the top temperature decreased to 22°C, with the side temperature also falling, to 27°C. Impressive huh? Yes, until you see the temperature results when we tested with a cheap \$14 Sunon 80mm case fan in place. Using the budget method, the top centre recorded a temperature of 20°C, while the side reached a very cool 22°C.

If it's not obvious to you yet, the following should clear things up for you: the Hardcano 5 is little more than an expensive gimmick, without any of the cool factor of the case modding gadgets we all know and love *cough* tachometer *cough*. Considering you're paying over \$80 for a fan speed controller, single temperature probe and a 40mm fan, you'd be much better off buying each of these components separately. □

SPECIFICATIONS

Aluminium construction; 40mm fan; 1-channel LCD temperature monitor.

Website: Thermaltake www.thermaltake.com.tw

Supplier: Anyware www.anyware.com.au

Phone: Anyware (02) 9879 5788 **Price:** \$80

6/10

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QLD/SA/WA: Harvey Norman and leading computer stores, nationally.



Bitspower NP478S



What do you do if your company makes a great enthusiast level AMD HSF and all of a sudden Intel CPUs start to rise in popularity with the tweaking market once again? Well, you could throw a bundle of money into R&D to

develop a new Socket 478 HSF, but this might cost a heap of dosh that could be better spent on leopard skin trim for the CEO's toilet seat.

Why not convert your existing AMD design into one that fits onto the Socket 478 mount? Welcome to the Bitspower NP478S. Judging by this cooler's performance, this was a wise move.

Just like the NP80D, this cooler uses Bitspower's 'skived' manufacturing process – the fins are part of the base, not tacked on later, which helps to move heat more efficiently from the base of the unit up to the fins. The curvature of these fins also helps to maximise surface area without making the heatsink too tall.

Mounted onto the heatsink is a low profile 3,600rpm fan, which pumps around 30cfm of air into the heatsink. A result of this increased airflow, when compared to the stock Intel HSFs, is a slightly noisier fan than what many Intel users will be accustomed to.

To test the NP478S we strapped it to our testbench P4 2.4GHz processor, overclocked to 2.91GHz with a 1.7V Vcore, which churns out a steamy maximum of 100W when under full load. For the sake of comparison we also tested the standard Intel HSF that ships with the 2.4GHz. We used the ABIT BD7-II RAID motherboard with ABIT temperature monitoring software. We also tested the HSF on an ASUS P4B533 motherboard with the CPU at its default speed, and recorded exactly the same temperature differences between the two coolers as the overclocked CPU. Ambient temperature was a constant 19°C throughout the testing.

At idle, the NP478S didn't exactly blow us away: it reached 41°C – a paltry 1°C improvement over the Intel cooler's temperature of 42°C. However, under 100% CPU load this cooler played a different tune: while the Intel cooler reached a dangerous 73°C, the Bitspower came in at a considerably cooler, not to mention safer, 67°C.

Considering that this cooler isn't much louder than the stock Intel fan, its excellent performance is commendable. It also happens to be pretty good value. If you're finding your overclocked P4 is beginning to strain the stock HSF, the NP478S comes highly recommended. □

SPECIFICATIONS

240 grams; 3,600rpm fan; 37dB/A

Website: Bitspower www.bitspower.com

Supplier: Hot Clocking Australia www.hotclockingaustralia.com.au

Phone: Hot Clocking Australia (03) 5154 2490 **Price:** \$53

8.5/10

Thermaltake G4-VGA Copper Cooler



The GeForce4 series of video cards is without doubt the ruler of the performance roost at the moment. But that's just not enough. Nope, you want to overclock your little NVIDIA to within an inch of meltdown, and in some cases such as the Ti4200, the result is a considerable performance increase. But what if you want to go beyond what the stock GPU/RAM sinks are capable of? You might be interested in a third party cooling kit, such as the G4-VGA.

This ships with a full copper GPU heatsink and fake copper RAM sinks. We say fake, because they're actually anodised Aluminium heatsinks made to look like copper. That should ring the alarm bells.

If you're running a Ti4200, you'll be running the older, cheaper and much hotter TSOP (Thin-Small Outline Package) RAM, which might benefit from the use of the RAM sinks. That's if they actually fit properly – the RAM sinks in this pack don't seem to align properly with the RAM on the Palit Daytona GF4 Ti4200 we used for testing, and actually prevented the airflow from the GPU cooler from flowing over the RAM. If you're running a Ti4400 or Ti4600, then your video card uses BGA (Ball Grid Array) RAM, which is so cool that RAM sinks are useless. So much for the RAM sinks then.

To test if the all-copper GPU cooler did anything other than making your GPU cooler look orange as opposed to grey, we fired up the Palit Ti4200 and overclocked it with the default HSF, then with the Thermaltake HSF. We also tried the card with and without the RAM sinks. We figured that due to the Ti4200 being the most overclockable GPU in the GF4 series, it would be the best host for testing this HSF. Ambient temperature was 19°C.

With the stock HSF in place, we managed to raise the core from 250MHz up to 315MHz – any higher and we'd entered an episode of *Crash Palace*. We then attached the Thermaltake offering, with a smattering of Arctic Silver III to ensure a decent contact, and began testing again, and 320MHz was as high as we could get it to run. While the core temperature decreased 4°C, from 47°C down to 43°C, a 5MHz increase is about as noticeable as a whopping 0MHz overclock. If that seems underwhelming, the 0% increase in speed that we noticed with and without the RAM sinks was even more disappointing. So there you have it: this kit is for all intents and purposes useless. This seems to be a common theme among video card cooling kits, suggesting that heat isn't the limiting factor when it comes to overclocking your video card. □

SPECIFICATIONS

Copper GPU heatsink; Anodised Aluminium RAM heatsinks, double sided tape.

Website: Thermaltake www.thermaltake.com.tw

Supplier: Anyware www.anyware.com

Phone: Anyware (02) 9879 5788 **Price:** \$30

2/10

Back the f* *k up



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Final Scratch




Atomic HQ needs a better music system to deliver the soundtrack for each issue. Not just an MP3-pounding Hot Box loaded with some dinky music mixing software, and certainly not what we're stuck with now: Bennett's jukebox of shite.

No, we demand a proper DJ booth where we can manipulate vinyl or digital recordings in an ear-pleasing, desk-tapping fashion. And to take full advantage of our massive MP3 archives, we need Stanton's new digital/analog DJ kit: Final Scratch.

Canadian acid/techno DJ and producer Richie Hawtin used it for his DE9 mix compilation last year: he saved 100 records as 300 loops on his laptop running Final Scratch, fed them via the kit's convertor into his mixer, and manipulated them with two slabs of special vinyl on regular decks. But he's a genius and we're not.

If you're familiar with turntables and can intuitively operate desktop audio playback software, then you're likely to find Final Scratch a comfortable evolutionary leap in DJing. The only problem we had loading WAVs and MP3s from the laptop was choosing which Atomican's music archive to start in first, but once that was sorted, we put the needles on the records and right away found we could cue and play any part of both loaded tracks accurately. How?

The vinyl contains a continuous (11+min) timecode, which when played through the analog-to-digital convertor, precisely matches elapsed time in the track. We were worried there might be some lag, but no – no drift and none of those jittery rodent noises that pass for scratches in popular MP3-DJ software. Better still, the waveforms on the laptop show in real time the peaks and breaks in each track: a hundred times better than peering at gaps in the grooves on regular records, and of course, they make cueing the beat as accurate as any CD deck.

Theoretically, you could never lug a backbreaking box of 12s again, but if you're slow to make the change, Final Scratch still lets you mix regular records without any awkward reconfiguration.

In the old days (a few years ago), the digital versus analog debate was so heated it was banned outright from several DJ email lists. Now that Final Scratch allows vinyl DJs to spin digital audio on their faithful turntables the two camps might mix happily at last; and if our bosses bought us this kit, we could make wicked little 'wakka wakka' noises with digital audio files all day long.

Happiness is an itch that always needs scratching. □

SPECIFICATIONS

Requires two turntables; two-channel mixer; laptop w/PIII 550MHz 128MB RAM, Linux, USB port and 2.5GB HDD.

Website: Stanton Magnetics www.stantonmagnetics.com

Supplier: Jands www.jands.com.au

Phone: Jands (02) 9582 0909 **Price:** \$1,695

9/10

XPSound XP201 phono pre-amp



Remember the not-so-small freakout the old people in your family had when their hand-cranked record player finally died in 1994?

Suddenly, more than a decade since the CD revolution began, they faced the prospect of replacing their huge collection of LPs with much more expensive and sonically colder CDs. Even if they'd bought dodgy discs imported from Bali, it would still have cost them most of your inheritance. Not good.

We've dumped some cheap and nasty things on CD since acquiring our first burners, but until recently quality recordings from vinyl have just sounded, well, cheap. Sure, with two turntables and a DJ mixer we've caught all the common ailments of vinyl, including crackle, hiss and fuzz, but not enough of the warmth and depth – until the XPSound XP201 came into the Labs. This unit offers a quality pre-amp pitched at DJs, musicians and audiophiles, packaged with the easy-to-use Diamond Cut 32 audio editing software. It can all be installed in about 15 minutes (including popping the case), but we struggled establishing a decent earth for the turntable; after changing plugs and connections we'd already eliminated the painful buzz before we needed to punch the XP201's built-in ground switch

on. We could have gone all Hendrix on the unit and tested it with a guitar as well – like it says on the box – but that would have meant inviting a sweaty rock pig into the Labs, and well, we were too busy grooving to old records to want to rock out.

For the money, the XP201's pre-amp is one of the best we've heard: we'd hardly turned the gain up and the boosted audio already sounded clear and plump; in fact, it did a better job than the built-in pre-amp on the thousand-dollar mixer we normally use with the decks. But our recordings needed tweaking: a quick check of the manual revealed why and how we'd want to spend time cleaning our audio files using filters to remove hiss, hum and clicks before applying swanky effects such as Valve Tube Emulation. As expected, the High and Low pass filters needed only very slight application to remove growl and hiss respectively – too much tweaking and our recordings flattened miserably.

It's easy to get carried away re-mastering old recordings, but with a little restraint next time an old geezer asks you to convert their favourite Engelbert Humperdinck records to CD, you'll finally be able to do them justice. □

SPECIFICATIONS

Fits 5 1/4" bay; phono pre-amp (RIAA EQ); RCA phono/line input; Power: cable, batteries or 9-12V adaptor.

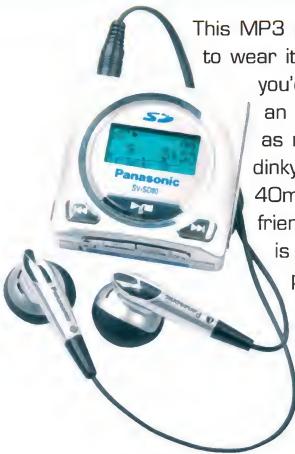
Website: XPSound www.xpsound.com

Supplier: Sound Music www.sound-music.com

Phone: Sound Music (03) 9528 5744 **Price:** \$199

8/10

Panasonic e.wear SV-SD80



This MP3 player is so small that if you were to wear it around the neck as intended, you'd lose the pose factor of wearing an \$800 matchbox-sized MP3 player, as most people would assume it's a dinky \$2 AM radio. At only 40mm x 40mm x 16mm, and weighing a geek friendly 38 grams, this wearable device is without doubt the smallest MP3 player available, with an inversely proportional price tag.

For the money you'd expect the outer casing to be made of a platinum/gold alloy – but alas this isn't so. Instead it's primarily plastic, which, while helping to keep the weight down, doesn't

inspire confidence that it can handle a beating. A plastic shell is included to cope with the rigours of a hearty workout (as if us geeks ever exercise, but anyway . . .), which also functions as a belt mount. This exoskeleton has room for a single AAA battery to extend the life of the included Nickel-Metal Hydride battery, from the usual 18 hours up to a massive 50 hours – impressive battery life to say the least.

A recharging dock for the Ni-MH battery is included; simply plug in the entire player and you'll be recharged in no time.

RealJukebox is included for ripping CDs and uploading them to the player, complete with all the joys of Digital Rights Management (DRM). This only allows three upload sessions (checking out) before you need to download the songs back onto your PC (checking in), which is just plain annoying. When we first tried to upload songs, we'd forgotten to check back in the songs we'd used for an earlier MP3 review, so we couldn't upload ANY songs at all. After trying another PC, uploading songs proceeded simply and quickly. A USB SD reader handles song transfer to the 64MB SD card that the player uses.

As for sound quality, this player might be tiny but it cranks out music at a fidelity greater than units quadruple its size. Standard EQ functions are also included, as well as full play list and song information features.

While it might be the tiniest MP3 player available, the same cannot be said of the price. And considering the lightweight construction, \$800 seems just a little high. But if you can overlook the cost and irritating DRM compliance, this MP3 packs a lot of punch from a very petite package. □

SPECIFICATIONS

64MB SD card w/USB SD reader; one Ni-MH battery with charger.

Website: Panasonic www.panasonic.com.au

Supplier: Panasonic www.panasonic.com.au

Phone: Panasonic 132 600 **Price:** \$799

7.5/10

JNC SSF-886B



JNC tends to make its MP3 players look like everyday items. The SSF-264 we reviewed two issues ago reminded us of a silver bullet, while the new SSF-886B looks suspiciously similar to those plastic cards Australians seem to love getting themselves into debit with. Thankfully it won't cost you anywhere near as much as a credit card.

While this MP3 player at 56mm x 86mm x 8.7mm looks much larger than the Panasonic e.wear player reviewed above, it only weighs a meagre 60 grams due to its extremely thin

width. If you ask us, with its sexy blue

anodised metal case it is a much better looking unit regardless of its substantially larger size, and it seems more able to cope with the rigours of being dropped and bounced around than the plastic shell of the e.wear unit.

Not only does this thing look great, more importantly, its sound quality is excellent, although it doesn't quite reach the eardrum busting volumes of the more expensive MP3 players.

This unit has 64MB of memory and the Lithium Ion battery hardwired into it, providing for up to 10 hours of playtime. If you want more memory in the future, you're going to have to buy the 128MB version, as there is no expansion slot for upgrading. If you're looking for an MP3 player that encumbers you with the

delights of DRM, you're going to have to look elsewhere. This thing will let you copy as many MP3s as your heart desires, with nary a consideration for copyright or ownership. Double WOOT!

Sony and Panasonic's MP3 uploading interface, while attractive, can only be described as a cumbersome way of doing a simple task. On the other hand, the BA-3's interface is downright ugly, but it's as simple to use as it should be: simply select the files you want to upload, and transfer them – none of this checking in, checking out, converting file type rubbish.

There are a couple of things that aren't so likeable about the BA-3. First up is the surprising lack of a belt-mounted carry case – instead you're expected to wear the unit on the supplied necklace, although it is slim enough to fit snugly into a shirt pocket. Second is the short length of the headphone cord that will be far too short for anyone who isn't an Oompa Loompa.

These concerns fade into insignificance when you consider the ridiculously low price of \$299 (which, by the way, is a special promotional price that isn't going to last forever). If you've got a spare three hundred bucks, the SSF-886B is a worthy excuse for blowing it. □

SPECIFICATIONS

64MB memory; USB1 interface; Li-ion battery with 10 hours playtime.

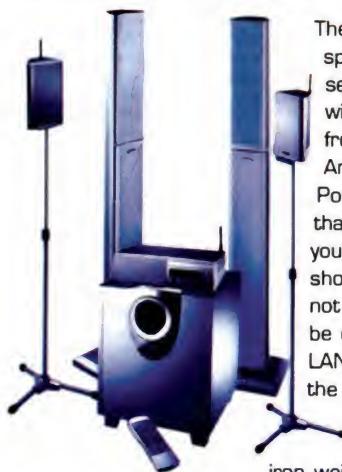
Website: JNC www.jnc-digital.com

Supplier: Datum Tech via www.jnc-digital.com

Phone: Datum Tech (02) 9264 8677 **Price:** \$299

8.5/10

JAZZ - JS9940 5.1 Wireless Home Theatre



The JS9940 speakers are the spunkiest looking things we've seen (our partners notwithstanding). Let us say up front, these speakers are good. Are they too good perhaps? Possibly. Do you need to spend that much money just to make your ears bleed? Of course. We should point out that these are not for casual gaming – you won't be dragging these around to LANs. They are damn heavy, with the subwoofer itself weighing close to 35kgs, and each of the tall front speakers has cast iron weights in the base for stability.

This system decodes Dolby Digital (AC3), DTS 5.1 and also the new Advanced Audio Coding (AAC) format. AAC is the latest in audio compression, rivalling MP3 in quality and compression ratio.

The centre speaker doubles as the transmitter for the two rear wireless satellites, and also houses the volume control.

The instruction manual was inexplicably missing when we tested this set, but we assumed that set-up would be easy. It wasn't. Once that was sorted... we started testing the bejesus out of this thing. Pumping through a couple of bass heavy

tracks, like Lenny Kravitz's *American Woman*, was a jaw dropping, ear popping experience. You can feel the air gushing from the subwoofer cone over a foot away. But it was the thick pumping bass, which came up through the floor and rumbled through our bodies, which truly rocked. The mid tones were smooth and comfortable, and the upper ranges clear and strong.

Watching the trusty old *Matrix* DVD allowed us to hear the 5.1 decoding performing flawlessly. The system also impressed us enormously, when hopping in for a few rounds of *Soldier of Fortune II*, and *Return to Castle Wolfenstein*, providing the sound effects with some much needed grunt. It felt like an earth tremor in the office when air strikes were launched or grenades detonated around us.

However, \$1099 is an expensive way to damage your hearing. The size and weight of these speakers makes them not very portable at all. Wireless rear speakers are a great idea, but there is still a power cable required for each of them.

Yes, these speakers are serious overkill, for any PC system. But we love that. □

SPECIFICATIONS

200W RMS total power (subwoofer 100W, speakers 20W each); frequency response: 30Hz to 20,000Hz.

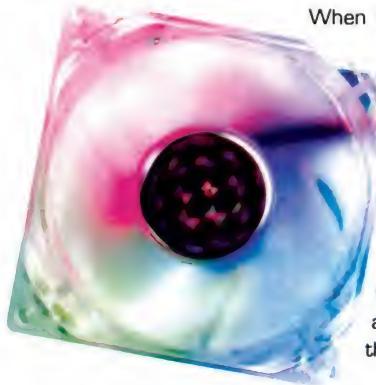
Website: Jazz www.jazzspeakers.com

Supplier: Rectron Electronics www.rectron.com.au

Phone: Rectron (02) 9748 7725 **Price:** \$1099

9/10

SF-801GL



When it comes to case modding there are two extremes: let's call them style and substance. On the style end you'll find the neon and Perspex crowd, happy to make their systems look cool; and on the substance end are those who don't care about looks, but just want their system to be cool.

Most case mods fall somewhere in between these

two extremes, but some products seem to fit one end of the market better.

Neons and cold cathodes are commonplace now, and the focus has moved towards different lighting techniques to show off systems. The SF-801GLO fan has all the hallmarks of a backyard mod gone commercial.

Essentially it is a low speed 80mm fan that has had three strategic holes drilled into the corners and LEDs mounted, with the whole assembly held together with some high quality sticky tape for insulation. Because of the funky light transmission qualities of translucent plastic these give off a nice diffuse glow, making even the most hardened beige box lover weak at the

knees. Unfortunately that is all it is: perfectly suitable but only for a specific niche. Such a product would be easy for someone with a bit of wiring know-how and some spare time to knock up in the workshop at a fraction of the cost.

The big detractor is that the slow speed 2,600rpm fan blows only a tiny amount of air (32cfm according to specification) so it is simply not suitable for people needing serious airflow. The flipside of this is that the fans are indeed quiet, something that a lot of people are looking for nowadays.

The other annoyance is that the fan uses a non-passthrough molex plug for power as well as a fan head for speed monitoring, which adds to the cabling headaches (and the LEDs are powered by the fan power so twiddling Baybus knobs will dim the LEDs as well as slow the fan).

While undoubtedly packed with ooh-ahh factor, the SF-801GLO fan fits into that style extreme of the case modding community, with an added nod towards the silent PC fans (pun definitely intended).

These fans make a very funky addition to your modded beast at a fraction of the price of competing solutions. □

SPECIFICATIONS

80mm 2,600rpm clear fan; three coloured LEDs; powered via a molex connector; fan speed monitor plug.

Website: N/A

Supplier: Anyware www.anyware.com.au

Phone: Anyware (02) 9879 5788 **Price:** \$20

8.5/10

Handspring Treo 270



PDAs have become run of the mill consumer items – even your non-techloving friends probably have one – so geeks no longer get excited about them unless the PDA incorporates mobile phone functionality. Then you're talking cool shit.

The Treo 270 is Handspring's new full colour, fully connected, fully sick PDA. Considering the range of functions this PDA is capable of, it's nothing short of remarkable that Handspring has jammed it all into a unit measuring only 108mm by 71mm by 21mm, with an overall weight of 153 grams. This is one titchy unit. A side effect of this small size is a relatively small screen area: at 160 by 160 pixels the backlit colour screen is significantly smaller than its competitors. While this doesn't have much of an impact on the banal tasks you might use the Treo 270 for, such as organising your contact lists or email, it does make Web browsing an issue.

Like most non-standard Web browsing devices, the Treo uses its own proprietary browser, called Blazer 2.1, to display Web pages in a format that suits the small screen. Unfortunately, in this age of spiffy Flashtastic Websites, Blazer 2.1 doesn't cope well with displaying complex Web pages. It often totally misses headers, or

re-aligns sections into the wrong place, making what used to be a simple to navigate page into a nightmarish IQ puzzle.

However, for simple sites such as www.nasdaq.com, Blazer 2.1 doesn't mess with things too much, making its Web browsing function useable for those who frequent sites with an emphasis on information instead of design.

The inclusion of a Dual Band GSM mobile phone into the Treo 270 also gives it the ability to act as a mobile phone, email station (POP3 compatible) or annoying text message composer (SMS). You might be surprised to see that the Treo 270 doesn't support Graffiti text import, instead it has a mini QWERTY keyboard, which we found easy to use after a bit of key bashing.

It appears that the greatest benefit of the Treo 270 – its small size – is also its greatest downfall, as most Web pages become very difficult to read on the minute screen. Users (and manufacturers) are going to have to get used to the fact that if you want a Web browsing device that's portable, it's going to be at the cost of making it too large to fit into your pockets unless, of course, you wear clown pants.

SPECIFICATIONS

Palm OS, 33MHz Motorola Dragonball VZ processor, 16MB memory.

Website: Handspring www.handspringaustralia.com

Supplier: Handspring www.handspringaustralia.com

Phone: Handspring 1300 728 725 **Price:** \$1,599

8/10

EPoX Bluetooth Dongle



Dongle is perhaps the funniest word in the English language. *Bluetooth* is another pretty chuckle-worthy word, so the concept of a Bluetooth dongle is hella cool just because you can constantly use the two words together when talking about it.

As the number of devices that use Bluetooth connections grow, the ability to add functionality to a PC via USB becomes more and more handy.

And that's cool too.

Mobo manufacturer EPoX has recently joined the Bluetooth revolution with its Bluetooth Dongle, a small USB key that contains the silicon and aerial needed to add Bluetooth to your PC. This short-range wireless communication protocol is designed for what the powers-that-be have designated the Personal Area Network, a means of communication between PCs and consumer electronics devices.

These sorts of dongles have a very limited range, and despite the inclusion of PC-to-PC software, their usefulness

for LANning PCs together is very restricted. Bluetooth delivers only about three or four metres of clear signal without the use of antennas like those supplied with MSI's Bluetooth motherboards.

The included software does work for file transfer between PCs but it is still reasonably slow, clumsy and incredibly short ranged. The 802.11 range of wireless networking devices is currently much more suitable for PC-to-PC communication.

The EPoX Dongle is still very useful for those who need Bluetooth though, as it provides a cheap, portable solution for connecting to Bluetooth devices.

There is little need to purchase one of these dongles unless you have devices that use Bluetooth. Networking range is too limited and Bluetooth can still be a complicated technology unless used with devices that support it.

Considering that Bluetooth-enabled Mobile phones and PDAs are becoming more common, the desire for connectivity is improving, and the EPoX Bluetooth Dongle provides an easy and transportable connection for those sorts of devices.

SPECIFICATIONS

USB Bluetooth connection; PC Bluetooth and networking software included.

Website: EPoX www.epox.com

Supplier: Westan www.westan.com.au

Phone: Westan (03) 9543 7733 **Price:** \$70

8/10



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GAMES >>>

24fps: smooth as sandpaper

Bennett Ring kicks and screams about why 24 frames per second is nowhere near the optimal frame rate for gaming.



There is an issue regarding frame rates that has been annoying me for a long time that I positively, absolutely, must clear up. The fact that I've just quit smoking and am full of pent up, animalistic rage makes this as good a month as any to vent. It seems there are certain people out in Consumerland who believe that anything above 24 frames per second is a waste, as that's the highest framerate our eyes can perceive. If you're one of these deluded imbeciles please read on. If you're not, and you actually use that spongey grey matter inside your skull, read on anyway, just so you know what to say the next time some fool incorrectly claims that 24fps is high enough to give the appearance of smooth motion. Told you I was angry.

Before I explain why 24fps is a piddling frame rate, let me just say that it should be bloody obvious that higher frame rates equate to smoother game play. Why else would we pump a couple of grand into our PCs every year so we can play at higher frame rates? If you're just doing it for bragging rights, I'm sure I can come up with a better way to waste your cash. Like the 'Porsche for Bennett' charity that I just set up using an off shore bank account.

The 24fps myth originated from the fact that movies and PAL televisions run at a meagre 24fps. Go anywhere in the world that uses NTSC (which purrs along at 30fps) and it becomes the 30fps myth. So why do film and TV appear to run so smoothly at such a low frame rate? There are a myriad of reasons, but easily the largest factor can be summed up in two words: motion blur.

If you were to look at a single frame from a TV or film scene that depicts a train zooming by the camera, or for that matter any scene which shows movement, you'd find yourself looking

at a blurry mess that would be more at home in an abstract art gallery. If you were to look at a frame from a 3D game of the same scene, it would be crystal clear.

To explain in depth why this matters I'd need to devote an entire issue of *Atomic* to the anatomy of the human eye, and tell you all about cool body bits like rods and cones. But all you really need to know, without training as an Ophthalmologist, is that through the use of this blurring (known as motion blurring), TV and film manages to trick our eyes into seeing what appears to be fluid motion instead of a stuttering mess. It's a very simple solution, but it does the job.

It is possible to do motion blurring when rendering 3D graphics, and it's now used widely in 3D animation, but when it comes to games there's a fundamental problem with this delivery. If you're aiming at that blur on the screen, which is actually Ben running to his next camping spot, which part of the blur do you aim for? You could simply register a hit whenever the gamer hit any part of the blur, but that would negate much of the skill that games demand. Less skill involved usually equals less fun to be had.

Motion blurring has been used occasionally within games to enhance the feeling of speed, such as the trails behind the balls in *Virtua Tennis*, but you'll notice that it's always used as an effect *behind* an object, ensuring you can still accurately shoot/hit/spray with whipped cream the object you've targeted. But you simply can't do motion blur across the whole scene if you want to interact with certain objects within the scene accurately, and this is a large part of what gaming is about, especially those games that involve putting little bits of lead into larger bits of flesh and/or vehicle. If you want a game's motion to appear

totally smooth, and we're talking as smooth as what the real world appears to our eyeballs, we need to hit around 70fps (it varies a little depending on the person viewing the action). Even this isn't a rock solid figure, as some people say frame rates over the 100 mark are necessary, while those involved in console game development feel that 60 frames per second is the Holy Grail of Smoothness. It has been proven that the human eye can recognise an image that is shown for as little as 1/220th of a second, so it could be that 220fps is the most desirable figure.

This isn't to say that 24fps isn't unplayable, as your mind will soon get used to the low frame rate and help to fill in the gaps. However, as soon as you see a game running above 60fps you'll immediately notice how much smoother, and therefore more realistic, it appears. If you don't believe me, fire up a game at 1600 x 1200 resolution, and try moving around. Sure, everything looks crystal clear but chances are you'll start to experience the chug chug effect. Fire up the same game with a resolution of 640 x 480; once you get passed the fact that everything is now a blocky mess, you'll most probably notice that when the camera moves around it appears to move much more smoothly.

I hope this finally clears up the old 24fps myth, among *Atomic* readers at the least. If you'd like to read a more detailed explanation of why our eyes are fooled by blurry pictures, head over to the most excellent article at www.penstarsys.com/editor/30v60/30v60p1.htm, which also happened to be the starting point for this article. Read it. Weep. Then send me an email at bring@atomicmpc.com.au with a hilarious story about your eyes playing tricks on you. At the very least, it'll put me in a better mood. Maybe. □

America's Army Operations

Hooah! It's time to lock and load with Gunnery Sergeant Bennett Ring.



ABOVE: Guns can jam in the heat of battle



ABOVE: AA encourages teamwork above all else



ABOVE: Unreal Warfare is used to great effect

Put *Atomic* down right now. Fire up Internet Explorer, or Netscape or Mozilla if you're a hardcore IT rebel, and plug in www.americasarmy.com. Start downloading the 221MB America's Army Operations Recon file. Now we've got that out of the way, we can get started on the review of this revolutionary game.

Developed over the last three years at a cost of over five million US dollars, AAO is a gift from the American Army to the world. You see, it's totally, absolutely, 100% free. And it uses the brand new, top shelf Unreal Warfare engine no less. Pick yourself up from the floor now. Its main purpose is to sucker young people into the US Army, but it also happens to be one of the finest, realistic, online-only, first person shooters yet released.

Before you're even allowed to play online, you'll have to set up a user account and pass the offline training stages: these include rifle range, obstacle course and advanced weaponry levels. Once you've passed these, you're then limited to a single online level based on the US Army MILES training system. In other words: laser tag. It's only after you've completed this map that you can begin playing the proper levels.

This revolutionary training system should ensure that players in the full-fledged maps have at least a basic understanding of the game's mechanics. It should also cut down on team killers, as these will get hit with a banned account if they partake in this immature pass time. Meaning they'll have to

pass all the time completing training again with a new account if they want to play online. Suck that one down, Mr TK-er.

Considering the US Army developed this game, it's no wonder that it happens to be easily the most realistic first person shooter ever. Your character can crouch, go prone, stand up, run, walk, crawl and even roll sideways, and each of these positions has a huge impact on your accuracy. For truly precise fire you'll need to use each weapon's iron sights, à la Operation Flashpoint, and then time each shot with the sound of your character's breathing.

As a result of the focus on realism, the weapon set is limited to the weapons used by the US Army, unless you happen to pick up a downed enemy's AK or RPK. Speaking of enemies, no matter which team you are on, assault or defence, your team members always appear as Americans, while the enemies appear as evil, nasty, terrorist types. It's a bizarre concept, but it works.

As we said before, AA uses the brand spanking new Unreal Warfare engine, which happens to be one of the most attractive game engines around at the moment. Character detail and animation is amazing, yet many of the levels are vast and open – again very similar to Operation Flashpoint. There is also a shortage of levels at the moment, with a meagre six for you to wreak havoc in. By the time you read this, there should be at least five more levels, and to extend the longevity of this already kick arse

title, the developer will be releasing specialist packs over the next month or so. First up is Sniper School, which will unlock two different sniper rifles for use in online play, followed by Airborne and Ranger schools. Lordy, the future sure is looking great for this game – provided the US Army delivers on its promises.

The launch hasn't been without its problems though. Currently the game still has issues with server stability, lag when more than 10 players are in a server, and a scoring system that doesn't always work. Normally such bugs would stop us giving the game a Hot Award, but it's free so we're willing to let these ride, as this reviewer has faith that these problems will be rectified sometime in the near future due to the high level of developer involvement and feedback within the AA community.

By now you've probably downloaded at least 10% of America's Army, unless you're one of the lucky SOBs on uncapped Optus Cable. Start getting excited now, because if you've ever wanted to be a soldier, America's Army Operations offers the closest experience to military life you can get without actually putting your life on the line. And it's all free. Too good.

9/10



GAME DETAILS

- FOR:** Free. Bask in the glory of the UW engine. Unrivalled attention to detail and realism.
- AGAINST:** Buggy scoring, lack of levels, server/lag concerns, high system requirements.

REQUIREMENTS: PIII 766MHz; 32MB video card with Hardware T&L; 128MB RAM.

RECOMMENDED: 1.5GHz+ CPU; GeForce3 or better; 256MB RAM.

SOUND APIs: Direct Sound **VIDEO APIs:** Direct3D

DEVELOPER: The American Army www.goarmy.com

PUBLISHER: The American Army www.goarmy.com

DISTRIBUTOR: The American Army www.goarmy.com

PHONE: N/A

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Pikmin

David Kidd reckons everybody should have their own carrot army.

atomic
HOT



ABOVE: Your Pikmin army at your beck and call



ABOVE: Pikmin with flowers: even deadlier



ABOVE: Even little Pikmin have a Mardi Gras float

Nintendo undoubtedly rejects a lot of game ideas. Yet legendary Japanese game creator Shigeru Miyamoto seems to have Nintendo's 'respectful' support for his trippy ideas, after all, he squeezed out *Donkey Kong* in 1981. So when he pitched a game where a little round spaceman employs plants of different abilities to run around and help retrieve spaceship parts he was probably met with quiet nods of approval, and slightly furrowed brows.

But does *Pikmin* justify Nintendo's leap of faith, or has Miyamoto eaten a bad batch of PikPik carrots? Yes, and yes.

After a short intro where our inch-high hero Olimar gets struck by an asteroid you're thrust into the garden of Miyamoto's head. Upon landing, Olimar sees his ship has lost 30 vital parts, and must recover them in order to get back home. Don't expect your standard weekend part-recovery bushwalk – Olimar has only 30 days to find the parts before his air supply runs out. Each day runs in real-time, without pause, leading to tense and frantic gameplay to complete the tasks before sunset. Many hardcore puzzle gamers won't like the timer, but each day brings such a well-balanced mix of puzzle and action that the stress levels stay at a healthy level.

The first tutorial is the only untimed day and gives you the basics of Pikmin growing, abilities and co-ordination. The rest is free-for-all and the game is so logical that there is little need for training wheels.

Part Lemmings and part Command and Conquer, your Pikmin are the means with

which Olimar must retrieve his scattered ship parts by defeating enemies, constructing bridges and knocking down walls in order to create a clear path to the ship.

The three different types of Pikmin each have different types of abilities that must be strategically applied to meet your goals: Red Pikmin are good fighters that can withstand extreme temperatures; Yellow can be thrown higher than the others, and can also place bombs; and Blue Pikmin can survive underwater. The longer Olimar leaves Pikmin in the ground before picking them, the more mature they become (signified by the leaf, bud or flower on their heads) and consequently, the faster they get. This combination of colour and maturity makes for a deep, yet accessible, strategy experience.

The gameplay can get repetitive, although the five locations offer enough diversity to keep it fresh. But the real criticism we have of the game is the method with which you must control, select and coordinate the often 100 member strong army you've got trailing behind. Without a mouse and keyboard shortcuts a mixed army poses problems, as the way to select, say, the Red Pikmin, is to release all of them (at which point they split off into colour groups) and then select the group with a cursor.

Pikmin can be given orders by pushing with the C-stick or by picking them up individually and throwing them at an object. Combat usually involves swamping the enemy, although tougher challenges require deft

control in order to throw Pikmin on to the enemies' backs. As combat is based on an initially cumbersome and counter-intuitive control method, it's a frustrating affair. The camera potentially complicates things, particularly when you're trying to aim the cursor, select Pikmin, avoid getting eaten and then rotate the camera at the same time. Mastering the controls is the hardest challenge in the game, but it's rewarding when it finally comes together.

The graphics are gorgeous, and littered with all things cute and friendly, and the Pikmin are so wonderfully modelled and animated that you'll feel pangs of sadness and guilt when they drown and their spirits fly away. Any interface issues gradually fade as you hone your skills and, although a little short, it's one of the most original and fun gaming experiences out there.

Overall, it's a timely reminder of what Nintendo and Miyamoto have been doing for twenty years: creating charming games that stand out against the waves of macho, masturbatory dribble that's been gracing consoles for the past few years. While it's not for everyone, it's a refreshing, well-executed hybrid that'll go down as yet another instant classic for Nintendo.

9/10



GAME DETAILS

FOR: Charming, original and refreshing. Successfully tackles real-time strategy, resource gathering and puzzle-solving in one gorgeous package.

AGAINST: Too short with a deceptively steep learning curve. Cutesy design won't appeal to everyone and the sound lacks character.

DEVELOPER: Nintendo www.nintendo.com

PUBLISHER: Nintendo www.nintendo.com

DISTRIBUTOR: Nintendo Australia www.nintendo.com.au

PHONE: Nintendo Australia (03) 9730 9822

Grand Prix 4

Will the latest GP title make George Soropos split his pants behind the wheel?



ABOVE: Track curves beg for antialiasing



ABOVE: The rollercoaster sweep at Spa



ABOVE: The most expensive steering wheel ever

No other game developer has focused its efforts so steadfastly and successfully on one goal as Geoff Crammond. Since GP1 on the Amiga, Crammond has maintained an unmatched record, keeping his series ahead of the game and the competition for over a decade. The fact he hasn't been knighted yet is a blight on the British establishment!

Crammond's GP3 was so far ahead of the competition it only recently got a rattle from EA's F1 2002, but then only because of the former's ageing graphics engine – GP3 still had the edge on gameplay. If you impatiently forked out for F1 2002 you're probably in desperate denial now, buying in to lame arguments about GP4 not representing the current season. Thanks to the efforts of the GP4 team, Infogrames has leapfrogged the competition with a game that brings new levels of realism and excitement to the PC. GP4 makes a bigger jump from the previous version than GP3 made from GP2, so expect some heavy duty hardware requirements. To give you a rough idea of what we're talking about, here are the system specs for the review machine and the resulting frame rates:

PC: PIII 1GHz; Danoz Direct motherboard with onboard Ab Blaster; 512MB 133MHz RAM; SB Live; GeForce4 Ti 4200.

Frame Rates:

- 800x600 all details on max. 29 fps
- 1024x768 all details on max. 22 fps
- 1280x1024 all details on max. 19 fps

Given the tweaking obsession that characterises all good Atomicans, you can

add a few fps if you have the latest groovy mobo and DDR RAM gear. As you can see this is a game to test your system, and some will need no other reason to buy it! The main cause of this relatively sluggish performance is GP4's awesome graphics engine. Trackside detail is richer and with more depth than has been seen before. Another important change is that teams now have their own unique car models instead of the GP3 cheat of having just one repeated twenty two times.

The all new graphics engine also pushes more polygons than ever before and incorporates high end performance options such as full transform and lighting, full scene anti-aliasing and a bunch of environment-mapped real-time shadows, environment-sourced reflections and a raft of different effects depending on the weather. F1 2002 had nice water-streaking effects, but GP4 has a much richer environment.

Other graphical improvements include active monitors in the pits which allow you to keep an eye on the competition just as the real drivers would, much more detailed crowds with flashing cameras and waving flags and a fully 3D pit team to look after the car. The TV replay camera is also quite special if you have the graphical grunt to run the game with everything cranked.

GP4's circuits have been given a massive makeover with accurate GPS and laser ranging data, making them the most realistic in any F1 game. However the most important feature of the new tracks for the real F1 freak is their use of varying width. In previous

games passing moves were made possible by the standard width of their circuits, which made some corners much wider than their real life counterparts. No more.

On the downside, GP4 only includes LAN multiplayer support due to FIA restrictions, so there won't be many Internet or LAN cafes around with PCs powerful enough to run the game well at anything over 640x480!

Gameplay has always been the focus of the Grand Prix series as Crammond has always incorporated a much more sophisticated physics engine than any of his competitors. GP4 continues this fine tradition and also tweaks some design elements to rebalance the game. The helpers (auto brakes, steering etc.) are now less efficient than they were in GP3 and using them has a more marked effect on your lap times.

The driving feel of GP4 is very slightly more forgiving than GP3, perhaps to reflect the improved technology in the newer cars thanks to more relaxed FIA rules regarding traction control and other features. To be frank, Grand Prix Legends still has the most accurate and realistic physics model of any racing title but GP4 comes a close second. There are many other things to be said about this great game, but all you need to know is that this is the best F1 game ever made. □



GAME DETAILS

□ **FOR:** It's the best, 'nuff said.

□ **AGAINST:** Time to retire that TNT2/GeForce256/GeForce2.

REQUIREMENTS: PII 400; 64MB RAM; 500MB HD; 16MB video; DX 8.1 sound.

RECOMMENDED: P4 1.6 GHz; 256MB RAM; GeForce4 Ti 4200+.

SOUND APIs: Direct Sound; EAX; EAX2 **VIDEO APIs:** Direct3D; DX 8.1

DEVELOPER: Simergy

PUBLISHER: Microprose www.grandprixgames.com

DISTRIBUTOR: Game Nation www.gamenation.com

PHONE: Game Nation (02) 8303 6800

9.5/10

Gran Turismo Concept Tokyo-Geneva 2002

George Soropos likes 'em hardcore and sexy – GTC is neither.



ABOVE: Taking up the rear in the GTR Concept car



ABOVE: Concept has the same eye candy as GT3



ABOVE: Featuring cars from the odd to the familiar

Game designers have been chasing the ideal of simulated reality since the lads at Atari wheeled the first Pole Position cabinet off the production line back in 1983. However, before the first Gran Turismo was unleashed in '97, it seemed it would be easier for car manufacturers to make their machines drive like video games than the other way around. Imagine a world where real cars handled like the ones in Ridge Racer. The sight of two thousand cars all doing handbrake turns around every bend in the M4 during peak hour would be one to treasure indeed.

Gran Turismo brought simulation accuracy to a console for the first time, and at the time of its release it was also markedly superior to anything on the PC. It was probably the first time in history that a console system had taken the lead in the simulation genre over the PC. GT has gone from strength to strength since and while it was at it, also helped sell a lot of cars. Real ones. You'd be surprised how many people have bought their favourite GT car!

Now that we've established the hardcore gaming cred of the GT series, it is our sad duty to inform you that GT Concept is actually an attempt to take a step back from the bleeding edge and create a more accessible game for the masses. If difficult qualification tests give you a brain rash GT Concept has been tailored to your cowardly and pathetic needs. If you've spent all year hiding in a cupboard because your little sister promised to beat you up if you couldn't get that Gold Professional license then it's time to scrape

off the cobwebs, send a really, really good note to your boss explaining why you've been AWOL for twelve months and join the GT club.

Concept has only one gameplay style, which is more like the old Arcade mode than the single player-only GT mode of old. The game is structured into five sections each with a forward and reverse version of a single track and eight locked cars to dig up. There are also four locked bonus race modes – these house the most interesting parts of the game and they're also the hardest to unlock.

All the tracks are locked when you first play the game, and they can only be used after passing a license test on each one. This is nowhere near as tricky as it has been in past versions of the game (if you're looking for the ultimate challenge, try getting the Gold licenses in the original Japanese version of GT1!) as all that is required is one complete lap of the track done under a certain time. The times are very forgiving for the Bronze and reasonably hard for the Gold. You'll need to do both on each version of a track, forward and reverse, to unlock two of the cars and then win in both difficulty levels to unlock the other two. Unfortunately for experienced GT drivers this means running a lot of easy races to unlock cars. Equally unfortunate for GT fans is the level of difficulty, which more than any other factor is responsible for the reasonably low score. Concept is just too easy. GT has always had a problem with its opponent AI, particularly when handling the really fast racing spec. cars. It drives far too

conservatively and is too easy to beat once you are familiar with the tracks, which brings us to the point that there are only two new tracks in Concept – another bummer. Polyphony has used some of these tracks (Autumn Ring, Midfield and Tokyo) for the fourth time now and while it's great for nostalgia value there should be new ones.

The name Concept has come from the fact that most of the concept cars from the 2001 Tokyo Motor Show have been implemented in the game. The performance of these cars has been guessed at in many cases, as their originals are nothing more than mock-ups, and so in the end they just feel like generic vehicles with any shape chucked onto them. Car setup can be fiddled with before a race (except in two player mode) but the lack of any parts shops from the non-existent GT mode makes it impossible to personalise your car's performance and ultimately this absence takes away most of the fun of the GT series.

Atomic is a mag for the hardcore, whether it be hardcore modders, gamers or tweakers. GT Concept is a game for the softcore – for all those frightened away by GT's complexity. There are some lovely new cars and two new tracks, and the price is cheaper, but it's not really an Atomican's game!

7 /10



GAME DETAILS

FOR: More accessible than GT3 A-Spec for the casual gamer; lots of snazzy new cars; special 'fun' game modes.

AGAINST: Only two new tracks; still can't adjust car setup in two player; no four player action; skewed towards easy difficulty levels.

DEVELOPER: Polyphony www.polyphonydigital.com

PUBLISHER: SCEE www.au.scee.com

DISTRIBUTOR: Sony <http://au.playstation.com>

PHONE: Sony (02) 9324 9500

OPERATION FLASHPOINT: RESISTANCE

Lt. Col. (ret.) Des McNicholas dusts off his M16 to save poor repressed Nogova.



ABOVE: Watch your back, soldier!



ABOVE: This can't be good...



ABOVE: Plane. Silly. But better than walking

Operation Flashpoint caused a stir last year, with a terrific story and marvellous sense of pace hiding fairly average graphics. Flashpoint gave players the chance to act alone or command a squad, in a series of long, tough missions that called for a little more thought than usually required in a shooter. The early missions offered a hint of the single player immersion we would soon experience in games such as Medal of Honor, and online support grew remarkably quickly. Operation Flashpoint: Resistance delivers a solid prequel to the original title and a few improvements.

Resistance puts players into the role of ex-special forces soldier Victor Troska, who recently retired to the island of Nogova after years of fighting. Just as his idyllic new life is sorting itself out, Troska sees the fledgling democracy betrayed by its failed communist leaders. The Russians invade to 'liberate' the population, and he finds himself commanding the remnants of the militia in a campaign to oust the overwhelmingly powerful Soviet forces. Short of trained soldiers, weapons, ammunition and just about everything else needed to wage war, Troska and his band of patriots must make every shot count and get what they need from the invaders.

Resistance is essentially a new 20-scenario campaign, supported by five additional single missions, improved multiplayer functionality (including a server browser) and some tweaked graphics. A few new weapons are also on hand, and players are given the chance to drive a wider range of

vehicles, including civilian cars, public transport and motorcycles. The emphasis on gathering supplies leads to some interesting missions, with low-cost success far more important than in the original, as early failure makes long-term victory almost impossible.

Resistance's interface is virtually unchanged, which means that squad control remains both incredibly comprehensive and frustratingly cumbersome. The pop-up command system gives straightforward access to movement, targeting, weapons and general command functions, but the need to scroll through menus doesn't fit with the general pace of the game and often means the difference between living and dying. It's not too bad when controlling a single character, but it gets in the way of squad control in the heat of battle and breaks the flow of the action. Sadly, what was seen as a fairly innovative approach just over a year ago now looks dated, although things do improve with practice and players will still be impressed with the range of options available.

Although the graphical improvements are not as marked as expected, Bohemia has upped the general terrain and character models to a fair extent and the external environments are large and well designed. Be warned that Resistance takes a lot of processor grunt to run at the high detail levels, and the relatively small improvement probably isn't worth the effort. That said, it certainly looks better than the original, and the long-range detail is particularly impressive. Things

are still a little sparse, but there's plenty of cover when it's needed and ground contours play a major role in most battles. The lumbering character animations are classic Flashpoint, which is nice, and the voice acting and scripts have improved significantly.

The overall feel of Resistance is boosted by a strong and believable plot focus, and a campaign that builds the tension very well indeed. A few of the cut-scenes are too long – particularly at the start of the game – but the bigger picture is well presented and the action is explosive once you're back in control. A few missions are let down by some excessively long marches to reach the pick-up point, but most are well paced and realistically designed. The AI is a little inconsistent, which doesn't help in some of the tougher missions. While it could be argued that the friendly militia troops wouldn't really be up to scratch, their tendency to stand around in the middle of a battle is probably over the top, and the regular Russian troops aren't much better in some missions.

Operation Flashpoint: Resistance hasn't delivered the big leap forward some players were looking for, but it's a worthy expansion to the original that combines a solid story with some first-rate action.

8/10



GAME DETAILS

FOR: Terrific new environments; good story; improved multi-player functionality.
AGAINST: Cumbersome control interface; inconsistent AI; and a few minor bugs.

REQUIREMENTS: PII 400; 64MB RAM; 650MB HDD (+original game); 16MB DirectX video card.

RECOMMENDED: 1.2GHz CPU; 256MB RAM; 64MB video card.

SOUND APIs: Direct Sound **VIDEO APIs:** Direct3D

DEVELOPER: Bohemia Interactive Studios www.codemasters.com

PUBLISHER: OziSoft www.ozisoft.com

DISTRIBUTOR: OziSoft www.ozisoft.com

PHONE: OziSoft (02) 8303 6800

SUB ATOMIC

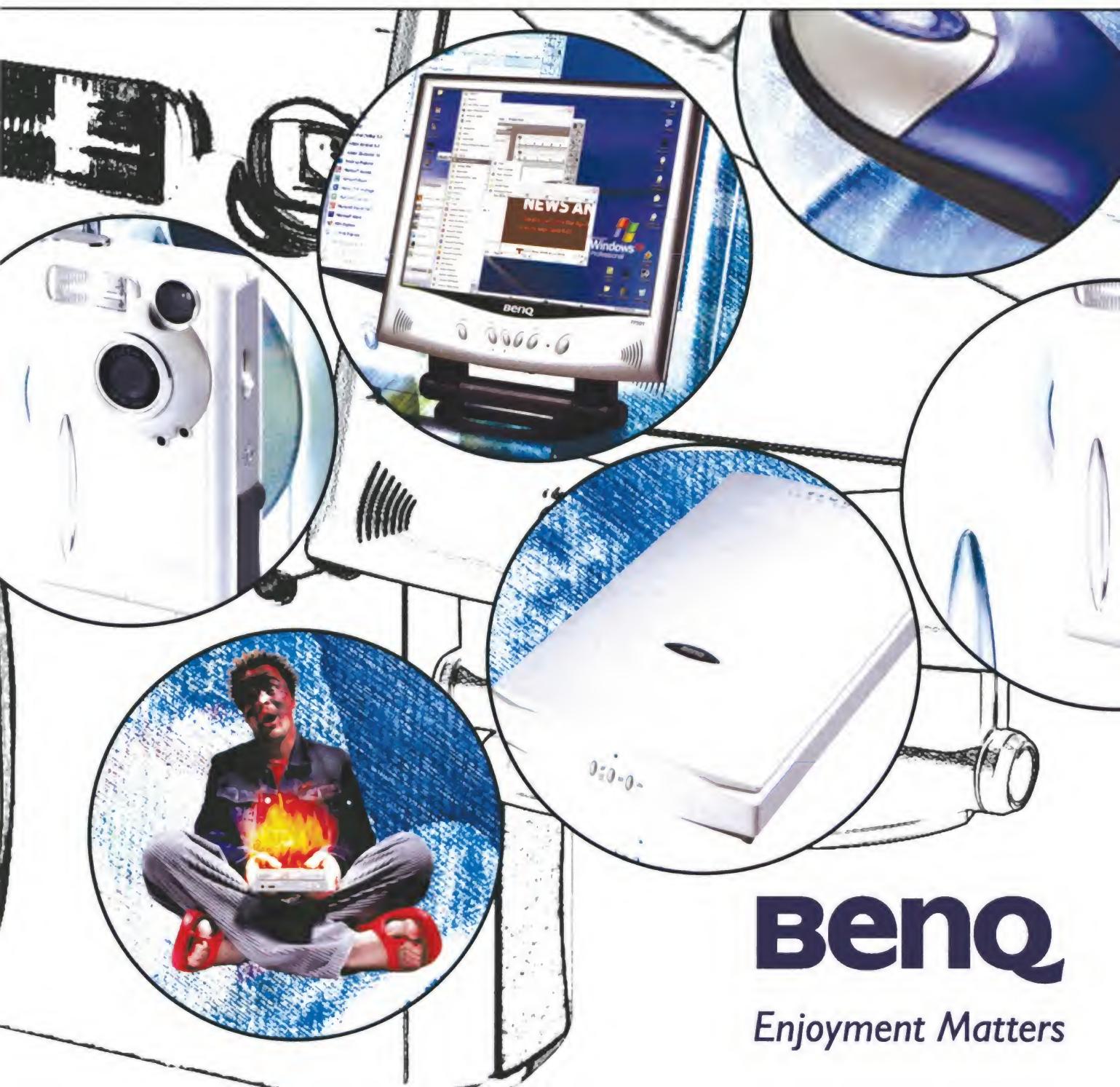
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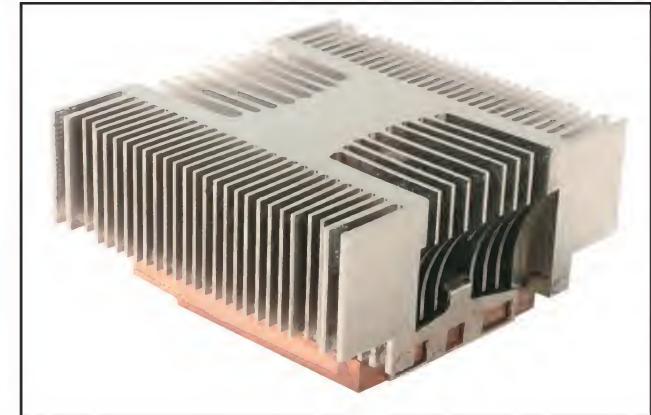
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Techno-files

For richer for poorer, for better or worse – all PCs and their owners have problems. We can't help with responsible owner advice, but Dan Rutter is the shoulder to dump your crying PC on. IOOTM scores the Thermalright AX7, thanks to Below 0 (www.below-0.net).



i IOOTM: Sticky question

I am preparing my case to be displayed in the Hot Box section of your magazine. How can I bond/connect a frame onto the side panel of my computer case without using rivets or any protruding objects that may mar the finish of the exterior of the panel? Araldite is the only solution that springs to mind.

The metals bonded are Aluminium (frame) and mild steel (side panel 1.6mm thick). I read in the packet that Araldite loses its cohesive properties at temperatures exceeding 60°C. Could you recommend a stronger compound that does not have thermal limitations and is suitable for those metals?

Related information: The frame will house a radiator which will be oil filled for cooling two CPUs. The radiator dimensions are 18cm x 25cm x 4cm, it will contain oil, and thus I estimate that the weight of it will be about 1.5kgs.

Felipe Plaza

O Use metal-filled epoxy. People fix engine blocks with the stuff.

Call around your local hardware stores and tell them you're looking for Devcon Aluminium-filled epoxy. There are other brands, but Devcon is the Kleenex of metal filled epoxies.

And yes, because it's metal filled, it's quite thermally conductive. So you can use it to stick heat sinks onto things.

Scuff up the bonding surfaces with the coarse abrasive paper of your choice and then thoroughly clean them before you apply the glue, and you'll probably find the resultant joint to be stronger than the riveted ones in your computer case.

i Silence!

Can I link my LaCie 60GB PocketDrive to a Yamaha AP-U70 PC Amplifier via USB?

I intend to play my MP3s (stored in the LaCie) through the amplifier without switching on the PC or connecting through it. The AP-U70 is said to handle any external device that has USB connectivity. Basically I want to use the PocketDrive as an MP3 player. The PC's fans are far too noisy.

Eli

O Sorry, no can do. You can't connect USB peripherals to each other, only to USB controllers – optionally, via hubs or other repeaters.

If you want a stand-alone MP3 player, you're going to have to, well, buy one. The AP-U70 has analog inputs as well as its USB connection, so you can hook it up to any MP3 player, or other ordinary analog stereo sound source.

Alternatively, you could try reducing the noise your PC makes by installing quieter fans or slowing down the ones that it has, putting sound absorbent material on the panels, and so on.

Or you could buy active USB extension cables (basically a one port hub built into a cable), which'll allow you to put the AP-U70 further away from the computer. The maximum length for a USB cable between hubs, or for a single active extension cable, is five metres. Given that you can chain up to five hubs or active extension cables from a root port, that gives you a maximum range of 30 metres. But think about it carefully: going to the full 30 metres will cost you more than \$200 in hubs and/or cables!

i Stolen memory?

I'm running Windows 2000 on a 233MHz Pentium II MMX, with 64MB of RAM. I won't mention any of the other stuff so you guys get a chance to catch your breath back and recover from your fits of laughter.

I understand about how the swap file works in conjunction with RAM, but what I can't understand is the report Windows Task Manager gives me on the current memory usage.

It says I'm using 137128KB out of a total 181384KB, and my swap file is about 126MB, so that sounds about accurate as a maximum. But when I added up the total for the currently running processes I got a total of 26320KB usage.

Could there be a bug or some kind of spyware stealing my extra memory?
Daniel Kennedy

O Win2000 running on a 64MB box. Woo. So how's the weather over there in Drive Flog Land, Daniel?

Your memory usage puzzle, though, is simple enough. Look at the Performance tab, and you'll see a buttload (a complicated technical term) of memory being used for caching.

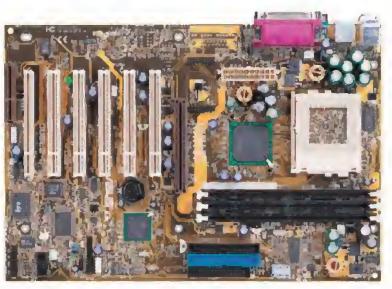
Back in the Win98 days, Windows' disk cache handling was quite lousy; these days it's pretty good. It uses lots of memory for the disk cache, but that works out OK.

You could still use some more memory in your system, though. Another 128MB, at least, would make a big difference to your system performance. Get more RAM by any means necessary and your 233MHz Pentium II will thank you.

i 4X! 4X! 4X, damn you!

I have a Hercules GeForce2 MX 400 on an ASUS CUSL2-C motherboard with a 1GHz Pentium III. The CUSL2-C is supposed to support AGP 4X. In the BIOS I set it to 4X. But in Windows XP it says it's running at 2X rate, in my NVIDIA driver settings under Hardware Options. When I try to set it higher, 2X is the highest it will go. Some people I talked to said to find a 4X registry patch, and someone else told me to update the motherboard BIOS to version 1007 because he said that 1009 didn't work, but nothing helps. I just want to enable 4X AGP. Any help would be appreciated!

Teejay Esmaquel



ABOVE: If your motherboard can only do AGP 2X, don't sweat it. The difference just isn't worth it.

O Apparently the CUSL2-C will only do AGP 2X if you're running an FSB above 140MHz. Abstruse BIOS changes or tweak programs may be able to get past this, but the limitation is a sensible decision on ASUS' part. Locking AGP down to 2X when this little i815 chipset board's AGP bus is substantially overclocked increases the probability of AGP continuing to, you know, work. If you're not running above 140MHz FSB, I don't know why AGP 4X isn't working.

You'll only notice a performance difference between AGP 4X and 2X, and the original 1X for that matter; when you've used up all of your video card's texture memory and the PC thus has to use system memory for textures. This 'AGP texturing' will cause your 3D frame rate to suddenly suck very very hard (in the case of AGP 1X), or very hard (for AGP 2X), or merely quite hard (for AGP 4X). Even AGP 8X texturing isn't a good performer compared with on-board graphics card memory. If you're not doing AGP texturing, the difference in performance between all of the flavours of AGP, and even between AGP and PCI (which can be thought of as 'AGP 0.5X minus a fairly large amount'), is small to negligible. So just use the computer.

i Parallel paralysis

Why does my somewhat tweaked, usually mildly quick WinXP Pro/Athlon XP 1800+/512MB PC2100/Epox 8KHA+/GeForce3 beige box run like a complete slug whenever I print anything to my (admittedly rather ancient) parallel Lexmark LXK3000 colour printer?

I'll define slug: while printing anything, the entire system crawls to a (near) halt, with tens of seconds of lag between USB mouse input and any corresponding action onscreen. Only happens while printing and it's annoying the bejesus out of me.

Is it 'cos the PC is connected to a patriarchal parallel printer? Are my simplistic settings slightly silly? Is it due to languid LAN lag? Is the beige box buggered? Aaaargh!

Brad Cordery

O This is the way of the parallel port, Grasshopper. The bad news: you're not going to be able to stop your computer from going into Cold Treacle Mode when there's lots of data being transferred via the parallel port.

The good news: you may be able to reduce the time your computer spends being slow and annoying for a given print job, by switching the parallel port to a faster mode. By default, your printer port may be in ancient unidirectional Standard Parallel Port (SPP) mode, or in the slightly less ancient but still slow Bidirectional Parallel Port (BPP) mode. Both of these modes are good for only about a third of a megabyte per second, at best. Every PC motherboard for quite a long time has supported the faster Enhanced Parallel Port and Enhanced Capabilities Port (EPP and ECP) modes, good for peak speeds of two megabytes per second.

Go into your BIOS setup utility (probably by pressing Delete when prompted at the start of the boot process), hunt up the parallel port mode setting, and see if it's SPP or BPP. If it is, select EPP. You *can* use ECP, but that needs a DMA channel, and EPP doesn't.

All of this will be pointless, of course, if the limiting factor is how fast your elderly printer can accept data.

i Choking PC

I have a problem with a startup file that I want to delete. The file is 'choke.exe -blahhh'. I ran msconfig.exe to disable it on startup. After I apply the setting to take it off, it tells me to restart my computer, so I do that and when it reloads again it tells me to run in normal so it can undo what I just did. I can't find the choke.exe file on my computer to delete it.

How can I delete this file?

Dean Giovannini

O You've got a virus – a worm, actually. W32.Choke.Worm isn't, however, a serious problem. See <http://securityresponse.symantec.com/avcenter/venc/data/w32.choke.worm.html> for removal instructions.

i Power plug perplexity

I'm soon going to get a Lian Li PC-60 case, and I'm looking for a good PSU. I like the look and power of the Topower 420 watt PSU, but when I looked back on your review, the PSU only had one plug in the back, obviously used to connect the PSU to the power point. My current PSU is only 230 watt, but it has a plug in the back for a monitor. If I get the 420 watt PSU, do I need to get a special cable to connect my monitor to the power point?

Jonathan Chong

O No. Just get an ordinary IEC lead: three-pin mains plug to three-pin IEC female socket.

This lead, by the way, is known to older and crustier appliance-botherers as a 'jug plug', because electric jugs were among the first devices to use IEC connectors for power.

The extra male IEC sockets on the back of some PSUs are just a convenience feature. They're switched with the PSU (or they ought to be, at least), so they let you turn on a monitor at the same time as a PC, saving one push of a button and one power point. There's nothing special about the power they deliver, though.

A plain old IEC power lead is all that you need.

'If you're not doing AGP texturing, the difference in performance between all of the flavours of AGP, and even AGP and PCI is negligible '

i Plug wrangling

I use a normal microphone (3.5mm socket) headset to dictate to my computer -the mic is plugged into the back of my Creative sound card. However, I need to be able to use my computer as a telephone by using my external voice/speakerphone modem.

The modem has a microphone and speaker jack on it. How do I set the system up so that I can talk to the computer but also talk through the modem? Do I have to split the microphone cable and input it into both the modem and soundcard, or can Windows (XP) be set up to send the voice to the modem automatically?

The same would apply to the speakers also: how do I get the sound from the modem into my headset speakers as well as be able to receive the computer sounds for music?

At the moment, whenever I want to call someone, I have to pull the microphone and headphone plugs out of the back of my computer and plug them into the modem, and then when I've finished, I have to plug them back into the back of the computer.

Heath L'Estrange

One solution to this problem is to use a switchbox. Assuming you've got a stereo headset and a mono mic, you need to switch three two-wire connections. The ideal gadget for doing this is a 'TV/game selector' switchbox, which is meant to connect to composite video and stereo audio input from two game consoles or similar devices, and select which one's connected to a TV.

These boxes just switch three RCA connectors, though, so you can use the video connector for the mic and the audio pair for the 'phones. You'll need a few plug adaptors and RCA-to-1/8th-inch Y-cables to connect everything, but it's doable. The switchbox itself should cost you less than \$20; the one sold by Jaycar (www.jaycar.com.au), for instance, is catalogue number AC-1668 and costs \$14.95. Alternatively, you might be able to rig up a computer-based system, but frankly I doubt it. Your sound hardware might have enough ins and outs; many current sound cards and built-in-sound motherboards have internal auxiliary input connectors, including one that's actually meant for modem sound. But you'll be shuffling mixer sliders every time you want to make the switch, if it turns out to be possible at all.

I'd use the switchbox.

i Cable hacking

I'm sure you know that rounded IDE cables come with two device connectors. In an IDE RAID setup, I only need one device per IDE cable. Is it okay to simply cut off the second connector?

David Johnston

Yes, it's fine. Make sure that you don't end up with bare wires sticking out of the cut portion and touching each other, of course. Also make sure you cut off the second drive connector and not the motherboard connector, otherwise your cable may be too short. 80 wire IDE cables have to be at least 254mm, ten inches, in length.



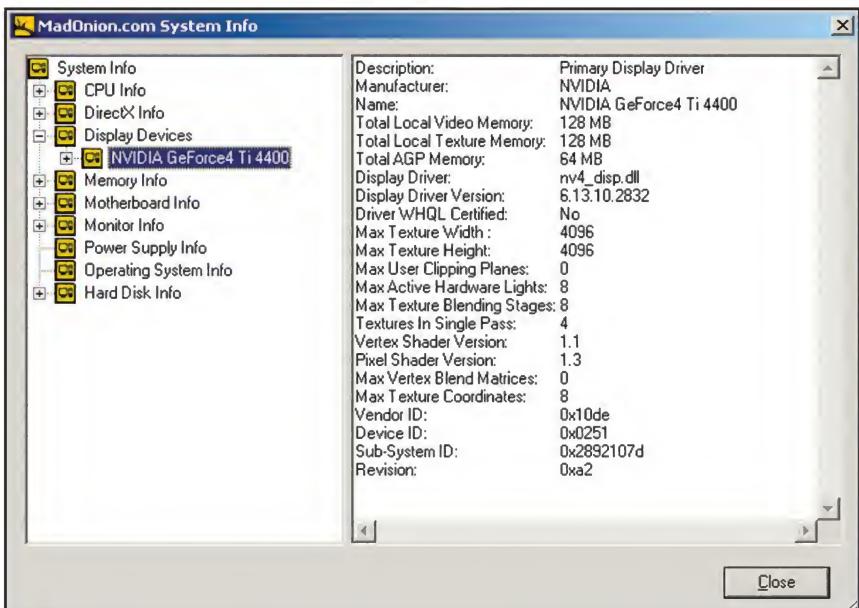
ABOVE: The two standard flavours of IEC power lead.

i Doesn't add up

I recently downloaded 3DMark2001SE and looked at the System Info details for my GeForce2 MX graphics card.

Total Local Video Memory and Total Local Texture Memory are both 64MB, but the Total AGP Memory is 32MB. Shouldn't it be 64MB too?

Dean



ABOVE: AGP memory numbers may or may not be informative.

The total AGP memory value in system info programs may be equal to the physical memory on your graphics card plus whatever AGP aperture value is set in your computer's BIOS... or it may just be the aperture value by itself.

The aperture value determines how much of your system memory can be used for AGP texturing, if necessary; some tweakers spend time fiddling with the aperture value, but there's not much to be achieved by doing so.

Regardless of how total AGP memory

is defined, you won't, necessarily see the right number when you look at the info display in 3DMark, or in other utilities such as NVIDIA's AGP memory display application (http://developer.nvidia.com/view.asp?IO=agp_memoryapp).

Your AGP aperture is probably set to 64MB, but graphics card drivers often can't figure out the right value, and deliver some semi-random number. Sometimes the reported value is zero bytes.

Don't worry about it, though; if it's wrong, it's just a cosmetic problem. □

THE IT DIRECTORY

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- Allteq Pty Limited
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- Alphazone Computers
- Aspen Tech
- ATF Computers
- AusPC Market
- Austin Computers
- Australian Computer Recyclers
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- AV Computers
- Below Zero
- Best Byte
- Bevdan Business Services
- Bitronics Computers
- Bits & Bytes
- BITS Computer Graphics
- Bitstorm
- Briter Computers
- Cam1 Computer Wholesale
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- CIP Computer Solutions
- Complete Peripheral Services
- CompuEdge Pty Limited
- Computer Cyber Shop
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- Cybus Computers
- Cydex Computers
- Dlife
- Dot Systems
- Duncan Computer Services
- DX Computers
- EBM Computers
- Electronic Product Warehouse
- Eurocom Computers
- EYO Technologies
- Flexinet
- FNQ Computers
- Games Warehouse
- Gigaworld Computer Systems
- Go-Xtreme Tek
- Griffler Enterprises
- Guillemot
- Hollywood 7 Computers
- HP Paradise
- INKme
- Inktec Australia
- I.T2 The Max
- IT National
- Jim's PC
- Karana Computer Systems
- KM Computer Systems
- LaCie Australia
- Landmark Computers
- Landmark IT Resources
- Lanyon Computers
- Laptop Land
- Lemurian Technologies
- Loucra Computers
- Mac Troubleshooter
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- Pullman Computing
- Punch Technology
- Purpose Built Computers
- QD Innovative Computer
- Rectron Electronics
- RTV Computer
- Santacom Computers
- Sasquatch Solutions
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- Speedcom
- Surplus Computer Products
- TEAC
- TeamLink Australia
- Technology shop
- Techno Magic
- The Cartridge Man
- THX – The SONY I.T Store (Parramatta)
- Toowoomba Computerland
- Trinix Computers
- Tweak Town Shop
- Warren Computing
- WB Gamezone
- Western Computer Networks
- XClusive Software

The Heavy Water Project: Phase 4 of 4

High art meets high tech meets the ultimate conclusion at the Heavy Water mark. After slicing, grinding and poking about in dark places, Ron Prouse still has eight fingers and two functional opposable thumbs. The world, and soon, one extraordinarily fortunate winner, has the Hottest Hot Box of them all. Rejoice.

Welcome to the final part of the Heavy Water Project, in which I will be covering the two main remaining subjects: lighting and water-cooling, but I am also going to include comments and tips about some of the other work you can do to really personalise your case. That is, of course, unless everybody does it, in which event it will become the 'norm', and that will then mean that a standard case will be the exception, and therefore. . .

Many of the steps up to now have

hinged around the placement of the water-cooling components and the motherboard that are going into this case, and my original idea to conceal 90% or more of the wiring (which has been achieved!)

In an effort to make the experience a true multimedia extravaganza, there are a plethora of additional pictures that will have been posted on the *AtomicMPC* Website, so grab your magazine, your mouse and your preferred form of relaxant and lets dive into the first subject.

Lighting

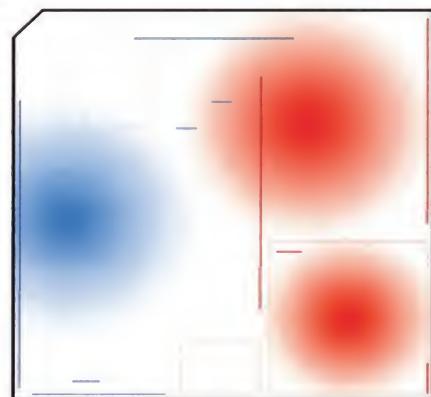
I have to make an admission: whether it's in the house, garden or computer, using artificial illumination to highlight features is one of my favourite pastimes. I know that's really sad, but I believe that there is

something about lighting that can really make or break the overall look of any project. . . an example of this is in that high-quality theme movie *The Fast and the Furious*. Would those black Honda Civics have looked as menacing without the blue neon lights under the side-skirts? No way! Lighting is about manipulating 'mood', and it can be used to create spectacular effects in your case.

There are plenty of options for the types of lights you can use. There are some real differences in their performance, but the simplest explanation is that cathodes are brighter, while neons offer a richer depth of colour. Two considerations when choosing either of these are space and power. Neons and cathodes require a power inverter to supply a specific voltage, sometimes as part of the tube, but more commonly as a separate unit - so there is one more component to hide. Make sure you have enough case length or height, too, because they don't bend! The second issue, power, can be a real problem if you have a PSU that only just meets your present requirements. If you are buying a new PSU then you can take your additional 12V usage into consideration, but what if you are limited to your present power supply? A cheap solution can be found at your local hardware store: a domestic 12V halogen

transformer will supply additional power for as little as \$15 for 50 Watts. Much cheaper than buying a larger Power Supply. At the bottom of the photo are some of the 'newer' offerings: 'Electro-Luminescent' products, including EL cable, tapes, etc. These products emit a 'glow' when power passes through them, however their MCD output is not high, and the effect tends to get 'lost' if there is another strong light source near them. And then there are LEDs. Cheap, robust and space-effective, LEDs can give great effects, especially if you throw enough of them in one spot.

Check *Atomic* issues 12 and 19, for Dan Rutter's excellent guides on using LEDs. If you would rather buy 'off-the-shelf' then LazerLEDs are worth looking at. These are either three or four high-output LEDs in a compact plastic case that will fit almost anywhere, and run straight off 12V.



▲ Sure, you can just buy a light, stick it in wherever there is room and be done with it, but they'll be better if you have a plan. There are a few things to remember, such as the available room, access to other components such as AGP and PCI cards, and shadows. By that last point I mean shadows created by other components. If you place your cathode tube at the bottom of the case very little light will get past the PCI cards to the top, and vice-versa. So that is where smaller, additional lights can come into play.

For Heavy Water I had a simple concept for light: red around the radiator and front drive bays to indicate the 'heat', and blue around the pump and CPU to give the illusion of being cool. The middle would therefore have a purple hue to it. I wanted the front grill of the Lian Li case to have red light flooding out too. It was decided from the beginning that each colour-section would be independently switchable, so the case could display several distinct 'moods' at the flick of the wrist. That is why the BayBus in issue 19 was designed to be 3 X 12V On / Off. The plan called for two red cathodes, one blue cathode, three red and three blue LazerLEDs, two blue neons and an assortment of standard LEDs! Over \$500RRP of glowing extravaganza.

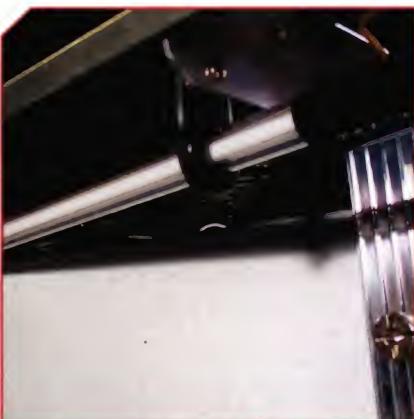


As mentioned before, many of these lights come with one major liability: the power inverters. They produce a minor amount of heat, but it still makes sense to have them near an exhaust fan, and they all need power, so keeping them together is going to make wiring up easier. Now, one thing that you need to realise is that the length of the wires from the inverter to the light is NOT a limiting factor to placement – they can be cut and extended just like any other wire, using similar flex to the original, which is available from any electrical shop. After



Mounting up the 12" cathodes is easy: just peel away the paper from the Velcro strips and push them against the case, right? Well, you could. . . but this is an *Atomican* case, so there has to be way more to it!

Firstly, how do you make any light more effective? Use a reflector. I've mounted an 'L'-shaped strip of Aluminium to the case and polished it to a mirror finish, so that it will reflect all of the light towards the case centre. This is a really good idea for any case, but it works to its maximum effect on a dull finish, such as



With the main lighting in place, it's time to look at fitting the additional lights – in this case the blue neons. The neon tubes that are used here are 10", with both of them being run off the one inverter. The leads are really long, reaching from the top to the bottom of the case easily, so I shortened the top one. The standard method of mounting these lights is by screwing them to the case through the 'eyelets' at each end of the tube, but standard is never the solution, right? I found that 19mm rubber grommets were a tight fit when slid over the tube, so I made up two



Now it's time to move on to the LazerLEDs, available in the common colour range and either three or four LEDs per case.

I've used the three LED units, and the two outer LEDs are aimed at a 45 degree angle from the centre, to give a good spread of light.

The four LED version is configured as a 'spotlight', with all of the LEDs converging at one point.

The main trick to getting a good effect from one of these units is NOT to mount it to a convenient flat surface with double sided tape as suggested on the packaging.

working out the space required I used a 40mm thick slice from the side of an old PSU case (never throw dead things away, send them to me!) which was just large enough to house and conceal all of the inverters. After cutting off the piece that I was going to use, all the sharp corners were rounded-off with a file and sandpaper, and a coat of VHT flat Aluminium high-temp paint was applied. The finished box was mounted at the top of the case, just below and to one side of the exhaust fan. Sorted!

a steel or painted interior. The cathode is then mounted to the reflector strip with the Velcro.

OK, but what about those ugly wires? If you look at the top of the cathode tube you will see the wires disappearing into some Aluminium tube that runs over to the inverter box.

The tubing is from the 'coil' on an old car-'fridge (throw nothing out!) cut to make use of the bend. While the cathode wires were cut I simply slid them through the tubing before re-soldering and insulating the joins with heat-shrink.

clear acrylic brackets to house the grommets and then screwed them to the top fan supports. The wiring was supported by also running it through one of the grommets.

By getting the length of the brackets just right the tube is positioned centrally, just above the top of the window and neatly out of view.

A soft reflection upwards is provided by the polished case floor, and downwards by the Aluminium finish of the inverter box – the top light reflects out through the blowhole as well! Bloody Sweet mate!

I've made a bracket from left-over case sheet-metal, so that it can be adjusted to shine exactly on the spots that I want lit up.

By bending the bracket to suit, you can then use the LazerLED in any position, horizontal or vertical. LazerLEDs are very compact (the three Spread LED case measures 1 5/8" long, 5/8" high and 3/8" deep) so they'll fit almost anywhere.

If you look at the insert in the picture, you will see one mounted between the upper and lower levels of the case floor, just in front of the audio-risers – concealed but effective! ▶



Visible in this picture is the new location of the HDD rack, above the PSU.

I have used the original rack upside down, with modified brackets so that it is still removable, and dedicated one of the PSU power rails (that has four connectors) to supply power to the drives.

The new location even has two exhaust fans directly behind the rack, and one underneath in the PSU, to ensure a flow of air over the HDDs.

The other thing worth mentioning is the terminal strip with the blue-covered wires running to it. The PSU came with a Pentium 4-specific power lead (2 X 12V)

and the usual 'Accessory' lead that no-one ever uses.

I have cut these two rails off, and now have another power-point that can supply 2 X 12V (Yellow / Black), 2 X 3.3V (Orange / Black) and 1 X 5V (Red / Black) connections. It can be used as an additional FanBus, to supply 'always on' power to mission critical components, such as CPU or GPU heatsink fans.

The black plastic apron underneath is an attempt to minimise dead shorts should a wire ever come loose. If nothing else, shortening the two looms helps to remove clutter and aids in airflow.



I mentioned the 'short' light between the fans and the I/O plate earlier. . . well there is a bit of a story to this, as usual. While working late one night, installing the cathodes, I shifted my position on the garage floor and heard a muffled 'crunch' from under my butt. Oh, great! Dead cathode tube! After arranging a replacement I sat and looked at the sad remains, and immediately had an inspiration. An LED tube! Sure, the actual cathode tube had died, but the plastic tube and mounting blocks were still intact. Gently prising them apart with a hammer, and shortening the tube to the required

length, I made a run of five blue LEDs (each with its own resistor so that if one blows the others don't).

The LEDs were High Intensity water-clear items from Jaycar (Cat # ZD-1781), and I sanded the lenses opaque with 1200 Wet'n'Dry to increase the light spread. The end-block was glued back on with acrylic cement, making sure it faced the right way (on the second attempt)! As a final step I ran the insulated wires through Aluminium tubing, across the top of the I / O plate and out through the mobo. It is as bright as a cathode tube but with a much richer colour.



There are plenty of other effects that you can get from using LEDs, especially if you look at some of the more 'specialty' types that are available, such as the flashing type I used in this mod.

If you look at the window tutorial in *Atomic issue 18*, you will see that I installed a red Perspex window with a customised *Atomic* laser-cut grill in the top of the case.

The intention was always to have this back-lit to make the logo really stand out – similar to the Batman logo light in the Gotham City night sky!

The idea was simple: a 5mm thick

piece of clear acrylic screwed down to two Aluminium brackets that were mounted to the frame. Everything was designed to be well clear of the top drive bay space.

Four LEDs were mounted through the acrylic (facing upward in a neat square arrangement), just inside the notional boundary of the logo. The LED power-leads were routed around the outer edges to a switch block. Each LED flashes asynchronously three times per second, so when Heavy Water is switched on at least two LEDs are shining on at any given moment.



There have been some nice modding accessories brought out by case and mobo manufacturers over the last year or so, and one of the most impressive is the Lian-Li EX-10 front Multi Media Panel. Designed to be used in a 5.25" bay or as an external stand-alone unit, the EX-10 brings most of the I/O panel connections to the front of your computer, such as audio, game port and PS-2 connector, and offering easy access to USB and FireWire (IEEE1394) ports, for digital cameras and video. The EX-10 has one major negative in a 'show case', and that is the DB25 cable that runs from the head-unit to a

spare expansion bay cover... straight past the mobo, in plain view of the case window, and adding to the cable-clutter that we are trying to avoid. Is there an option?

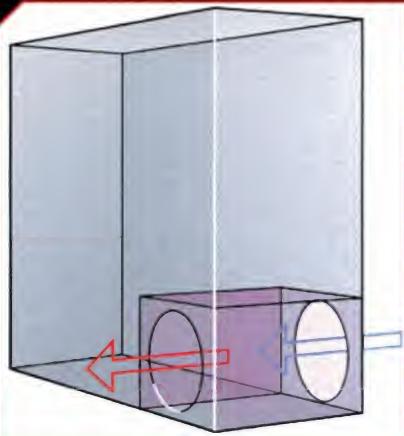
Mod the case so that the connector plug, and therefore the ugly cable, are at the top where they can be hidden from view! With the Lian Li PC-70 there is just enough room to mount the connector block next to the PSU, using the specially supplied PCI bay-cover as the finishing trim. The added advantage is that the cable is then long enough to be able to have the multimedia panel in the top drive-bay of any case, where it is easier to access.

Water-cooling

Water-cooling is a piece of piss. That's right: no 'selling your soul to the Dark Side', just careful assembly of simple components, and you are a fully-fledged liquid disciple.

How hard is a water-cooling system to build, can it be self-contained and, what components are needed? Read on for the *Atomic* solution, and see how Heavy Water earned its name... While common sense is an issue in itself, most of the things I wanted to incorporate are based on it:

- Have everything contained inside the case, but keep the weight (centre of gravity) low;



- Have as little vertical separation between the components as I could (it's called 'head')
- Keep the radiator in its own enclosure to minimise the heat transferred to the main case area;
- Automate the water pump switching with the PSU; and
- Keep all of the wet components as far away from any 240V source as possible (eg. nothing that could leak into the PSU)!

This meant that the airflow had to be 'across' the case, something I hadn't seen done before, but it made sense as long as there was adequate ventilation around the inlet and outlet fans. New owner take note: don't park this case next to a wall or desk!



▲ The Silverprop Silver Storm radiator looks fantastic and I almost felt guilty as I cut away the polished shroud. The Lian Li has a removable HDD rack, and that area was almost exactly the size the radiator needed, so out it came, along with the retaining brackets and PC speaker. Ditto for the front fans, then the air-filter, front USB ports and FDD cage.

The partition was made out of Aluminium stock, Lian Li side-cover sheet Aluminium, and a Perspex cover was made with a cut-out for the radiator inlet hose. An Aluminium 'lip' was added to the front of the area for the Perspex cover to mount to, and the floor was covered in rubber to minimise vibration.

Look closely and you'll see a clear Perspex 'baffle' (with a 120mm hole in the centre) between the radiator and the area closest to the camera. Air will always follow the path of least resistance, so if there was a push-pull fan arrangement without some sort of restriction, the majority of the airflow would be around the radiator rather than through it. In fact, a 120mm Enermax fan screws directly to the baffle plate, giving the airflow no choice but to pass through the radiator core, while a 92mm Enermax on the intake side provides constant positive pressure.



I mentioned in the 'Lighting' section that reflection is the best aid to getting the most out of the lights that you have, and this is one of the best mods around to achieve just that: polished Aluminium checker-plate.

The raised sections will pick-up and reflect any light source in your case, and provide additional highlights if you have more than one colour colliding, such as the red and the blue here.

In this example the checker-plate has another function as well.

Look closely and you will notice that



▲ The Enermax fans were chosen because they are speed adjustable. Even though they are connected to the standard Lian Li Hi-Med-Low switch, the additional adjustment means that intake and exhaust air speeds are independently adjustable. While the mechanics were being sorted out, the aesthetics were also being considered. Without any fans in the front panel it seemed pointless having an air-filter there, especially as it was going to let air escape and mess up my wind tunnel effect – but I didn't want to just block off the holes with sheet metal. I had this mental image of red light flooding out through the front grill, so the answer was to replace the foam filter-element with a 2.5mm thick, red-tinted piece of acrylic. I'd already decided the radiator area was going to glow with red light, so three LazerLEDs and a home-made four LED array were concealed in each corner. At the bottom of the picture you'll see the floor under the radiator is covered with black rubber. When I first tested the radiator set-up there was a low-pitch drone caused by the fan and the radiator inducing some kind of harmonic amplification through the case floor – in plain English, it was noisy! As soon as the radiator was mounted on rubber, the problem was solved.

there are two levels, the front one being 15mm higher than the rear.

The concept here is that all of the mobo wiring, temperature sensors and audio cables can be run down through the PowerPole, concealed under the front level, and then run out through the gap between the levels to connect to the mobo, sound card, etc.

In some of the final pictures you will see that the audio cables have been run through 7mm Aluminium 'riser tubes', screwed into the front floor, to further hide any wiring.



▲ The 92mm fan was mounted to the intake side-cover, with an *Atomic* grill of course, but the exhaust vent was a bit more complicated. It needed some sort of 'screen', something that would let the air pass through easily, but obstruct the 'inward' view. The answer was to use another piece of red acrylic, with 19mm stand-offs, leaving a suitable air-gap around the perimeter. The added visual advantage is that with the lights turned on, a deep red glow emits from the fan-hole and lights up the fan-grill giving a real 3D effect. The edge of the red acrylic plate is visible in the picture, just above the lip of the window.

Like so many things that happen by trial and error, I found this solution had an additional benefit – noise reduction. When the plate was fitted, there was a discernable drop in the amount of noise from the 120mm exhaust fan. Thinking it through later, it made sense. Noise is 'linear', and reflects well off of smooth surfaces, whereas air is a liquid, and flows around objects in 'the path of least resistance'. The plate over the exhaust hole is reflecting the noise back into the case, but because higher pressure will always flow to lower pressure, the air movement is not noticeably affected (scientific measurement used: wet finger in front of the hole).



▲ With the radiator sorted out it was time to turn to the waterblock: a Silverprop Cyclone 5. When I first looked at the finish on the CPU-contact area I was a little disappointed with the obvious milling grooves across the copper surface. The base really needed some attention before it would be ready to use. While I was at it, I polished off the original flat Aluminium finish on the top and sides, and ended up with a mirror shine. Now, I'm going to start another heated argument in the Forums regarding lapping. I have read a lot of opinions about lapping to a mirror finish, one being that if you get to this level of smoothness then you will actually reflect the heat back into the CPU core. Yeah right! Light and heat don't share any dispersion characteristics when it comes to the environment inside a PC – where the heat source is in direct contact with the diffuser, and a thermal conductive paste is used as a medium. I agree that getting the surface to a shiny mirror finish will usually not make any discernable difference to the efficiency either way, but getting the two mating surfaces as flat as possible will increase the contact area, and that will make a positive difference. If 'flatter' means 'mirror', then mirror must be better! The defence rests.

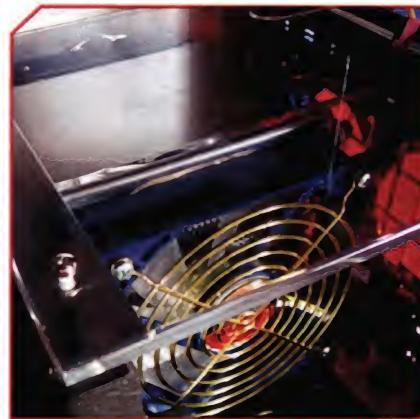


▲ One thing I don't like in most water-cooled rigs are the inevitable ugly hoses going in every direction. Are they really unavoidable? The vision for *Heavy Water* was that the finished case would be as minimalist as possible: no unnecessary hoses, cables or wires showing anywhere. So when it came to the plumbing getting the look right called for something unusual. Enter 4mm thick, 12.5mm inside diameter acrylic tubing! In this picture the tubing is joined with black poly-pipe fittings, which didn't really work, because the glue wouldn't stick. The final assembly was done with copper elbows, O-ringed and glued together with two-pack epoxy. Maximum head was gained immediately after the pump exit, to minimise back-pressure – the greatest variable impacting flow-rate. The pump used here is an Eheim 1048, with the end-cap removed and a neat dress-up cover fabricated out of Lian Li sheet-metal. The contact area through the partition is padded with rubber to reduce vibration and prevent warm air being transferred into the main case area. The power-cable is concealed in the side of the PowerPole, and the outlet plumbing from the waterblock to the reservoir is through genuine Eheim tubing.





▲ Finding a suitable reservoir was becoming a real task until I saw an advertisement for stainless steel travel mugs that held 425ml, cost \$10, and looked like my interpretation of a computer reservoir – well, at least it did once the handle was removed, a clear acrylic section was added into the lid and the hose-barbs were fitted. The container is actually a thick plastic insert with a stainless steel cover over the top. The intake barb was fitted into the side at approximately 1/4 of the height and the outlet runs out of the bottom. This means that gravity is 'putting something back' into the flow rates. As well as using epoxy glue to secure the fittings, silicon was packed around the joints on the inside. Brackets were fitted, and the reservoir attached to the back of the PowerPole – this position was chosen so that even if it leaked, none of the fluid would run over any of the electrical components, especially the mobo. In service, filling the system through the radiator evacuates 98% of the air immediately, and the pump is automatically primed from both sides of the impeller. Within 10 seconds of starting the system for the first time (hotwiring the PSU) there were no bubbles to be seen, and there has not been one drop leak in two months.



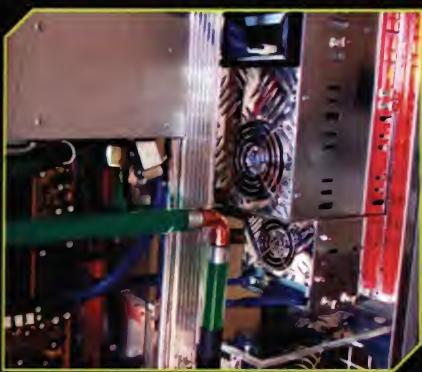
▲ This is what you see if you look into the case through what used to be a front door security viewer. I wanted an easy way of checking the fluid level in the reservoir, and that meant being able to do it from outside of the case. There is an 'always on' white LED just above the reservoir that illuminates the coolant inside, so level checking is a simple process – but if the coolant level drops, then the question has to be 'Where did it go?' just before you hit the 'Off' button! The fact of the matter is that one decent leak from the cooling system could result in a major loss of equipment, so there's obviously a need to perform regular maintenance to avoid any compounding issues. An analogy: Your car suddenly leaves oil stains on the driveway, do you:

1. Get annoyed about the stains;
2. Check where the oil is coming from and do something about it; or
3. Just keep pouring more oil in as fast as it bleeds out?

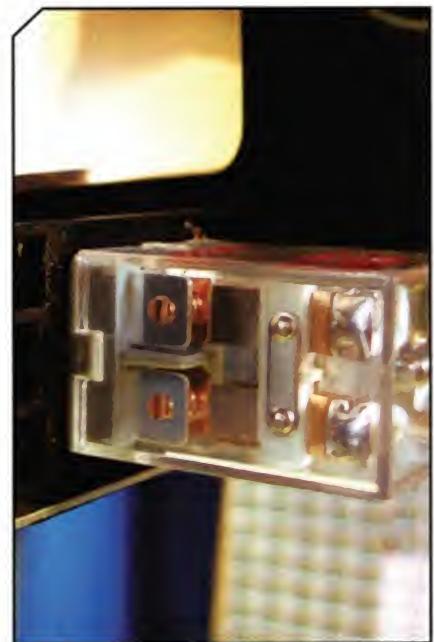
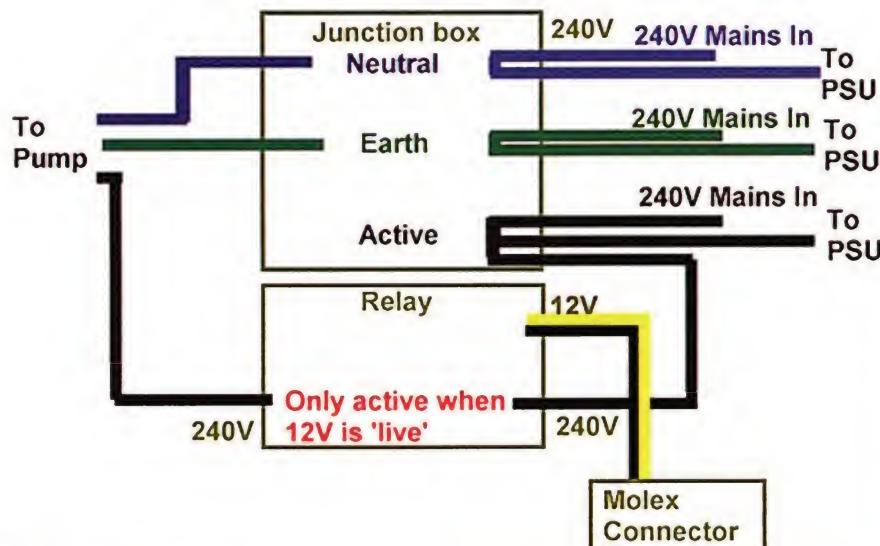
If you chose the first or last course of action then your water-cooled computer will probably get similar treatment, and eventually die a premature death. Water-cooling adds an extra dimension to performance, but there are some additional 'care factors' that come with it. Regular checks are the key to long and happy overclocking.



▲ We now have a fully cooled CPU, but at the expense of the two front intake fans the Lian Li comes with OEM. There was a need to balance out the case ventilation with additional intake fans. I dislike the look of empty drive bays on the inside of the case, so I regularly fill these bays in with sheet metal. This hides the wiring at the back of things like the DigiDoc5, LightBus and CompuNurse panel. If you look at a Lian case you'll notice the bezel is 25mm thick, but it's mainly air-space, and the cover-plates have air gaps at the top and bottom, so there are many places that air can pass through. I've used the checker-plate panels as mounting points for two inlet fans to suck fresh air in through the front and circulate it over the mobo and PCI slots. As the fans are mounted internally there is no noticeable noise transmitted to the outside. BTW, I counted up the fans in the case three times, and I still couldn't believe it! Four in the back, three in the PSU, one in the top, three in the HDD cooler and two for the radiator. Forgetting the water-cooling fans, that's six 80mm and two 92mm – all exhausts. And three 40mm intakes. Shit! This thing sounds like a Force Nine gale, right? Not so! All of the fans either run on 7V, or have been adjusted to minimum speed, so it's quieter than a standard PC. ▶



12V relay switching water pump



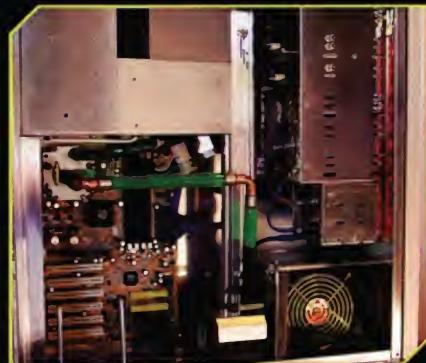
The BenQ CDRW arrived just after *Issue 19* went to press, and was immediately given the Lian Li cover-plate treatment. As mentioned in that issue, the CDRW is the hardest drive to mod, mainly due to the need of getting the tray dimensions spot on and lined up, but it's really just a case of following the method described previously. To trick up the look a little, I have used mock Carbon Fibre on the door, similar to the Lian OEM trim, so that everything matches.



A final look at the wiring. Keeping the case free of wiring meant that it all had to be concealed, and this is where most of it went. You'll notice that I have used quite a few terminal blocks, mainly because of the flexibility that they offer, but also because it makes the PSU easier to remove without tearing out the whole wiring loom. Another idea I've used here is a horizontal PowerPole, from the mobo tray across to the drive area. As well as concealing them it keeps the wires safe from being damaged when removing the

The floppy drive cover is an alternate way of getting the same effect without as much hard work. This is a genuine Lian Li accessory, and is a 'stick-on' facia plate. The finish is not an exact match to the rest of the bezel, but it looks much better than the standard beige, or the silver paint option. At the moment these fascias are only available for a limited number of drives (eg. Mitsumi FDDs only), but the word is that the range will be expanded over time.

RHS cover. Any wires that have been left naked have been covered over with an insulation material called spaghetti (the best explanation is that it is the opposite of heat-shrink). This stuff expands considerably when soaked in Acetone, and then shrinks back to its original size over a few hours as the Acetone evaporates. It's quite thick and offers snug protection for any wiring loom. It used to be used extensively by electrical motor re-winders, and that's where I'd start looking to purchase some – I inherited it from my Father!



Win the Ultimate PC!

The lovingly crafted, exquisite quality Heavy Water Project will end up being the Supreme PC, and if you've been paying attention over the last few issues it could end up being yours. As much as it pains us to part with this

massively beautiful masterpiece of computing technology, we will be giving it away when it's complete to a very deserving winner.

By now you should have answered the complex questions at the end of previous Heavy Water tutorials, so you're nearly there. We'll pick the winner randomly from someone

that got all four ultra-hard questions correct. Enter by emailing your final answer to win@atomicmpc.com.au with 'Heavy Water part 4' in the heading.

Q: Despite the warm growth environment that a water cooling system provides, why should you avoid using algaecide in the water?

SUPPLIERS:

Funding a project as ambitious as Heavy Water would have been a tedious process if it weren't for a few very special companies who enthusiastically offered their support by supplying the whole

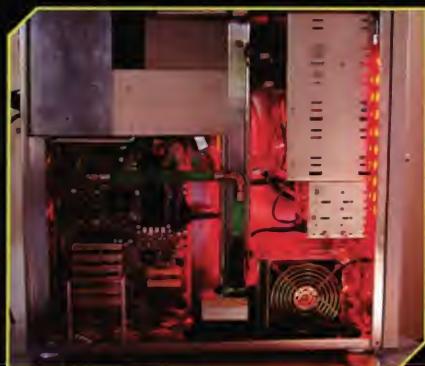
gamut of raw materials needed for this most ambitious project.

Thanks to these companies Heavy Water is not only a work of case modding art, it is also an amazing example of cutting edge PC technology, with an Athlon XP 2200+, GeForce4 Ti4600,

512MB DDR400, 160GB HDD, and Audigy all powering this cool Aluminium beast.

We hope that you show your appreciation of their amazing Atomican support by putting them on your next shopping list. This is, after all, the ultimate gaming 'Beast'.

Supplier	Provided	Contact
Anyware Computer Accessories	Lian Li PC-70 USB case , Macpower Digidoc 5 , Lian Li I/O panel , Lian Li LCD Temp gauges , 20 thumbscrews, Thermaltake Crystal Orb	Ph. (02) 9879 5788 www.anyware.com.au
AusPC Market Pty Ltd	Super Flower 550W PSU, Mitsumi FDD , Lian Li FDD plate	Ph. (02) 9817 2899 www.auspcmarket.com.au
AMD	Athlon XP 2200+	Ph. (02) 8877 7222 www.amd.com
ABIT	KX7333-RAID Motherboard, Siluro GeForce4 Ti4600	www.abit.com.tw
Maxtor	Three DiamondMax Plus D740X 80GB ATA133 7,200rpm HDs	Ph. (02) 93693662 www.maxtor.com
Altech	One 512MB Corsair XMS-3200 (400MHz) DDR-RAM, One 100Mb Alfa NIC	Ph. (02) 9748 2233 www.altech.com.au
Creative	Sound Blaster Audigy DE	Ph. (02) 96666100 www.creative.com
Silverprop	Silver Storm Radiator , Cyclone 5 Waterblock	Ph. (03) 9820 0908 www.silverprop.com
PC Case Gear	Two Cold cathodes , two neons , six LaserLEDs, two Laser Grills, six Plain grills, seven Enermax, one YS Tech, one AVC fans, Window etch and misc goodies	Ph. (03) 9572 3444 www.pccasegear.com
Pioneer Electronics Australia	106SZ Slot-loading DVD ROM	Ph. (03) 9586 6300 www.pioneeraus.com.au
BenQ Australia	32X10X40 CDRW	Ph. (02) 9714 6800 www.BenQ.com.au
PC Range	Two 60cm IDE and 48cm FDD rounded cables	Ph. (08) 8322 9378 www.pcrange.biz



THE UBER-LINUX BOX PROJECT

Wondering what to do with the spare parts from your last upgrade? Why, build a server box of course! Ashton Mills wants you to round em' up, throw em' together, grab a seat and ponder these penguiniferous words – we're going to build you a boom box. But not just any box, no no – the *Atomic* uber-Linux server box of joy!

The world can, conceivably, be divided into two camps: those who like Linux (or Unices in general) and those who don't. The latter really don't understand what the heck some people find so attractive about the free operating system. The former, having discovered it, wonder how they ever managed to live without it.

If you're somewhere in between and wonder what all the fuss is about but so far haven't checked it out, then this guide is for you. Over the next three issues we're going to show you how to explore Linux by actually building something useful out of it and putting it to use in your home/flat/secret bunker. And all in true Atomican style: under the hood, building it yourself, and with a grain of salt.

The tutorial is divided into three parts each of which can be done on its own or, if you follow each one in turn, you can create a multi-purpose rock-solid server that doles out files for your LAN, shares and secures your cable connection, and does nifty things like always-on game serving and distributed computing – all from the same box, remotely administered, from the comfort of your Windows machine.

Sounds fun? Of course it does, this is Linux!

What you need

One(1) PC, any size will do (size isn't important, really!)

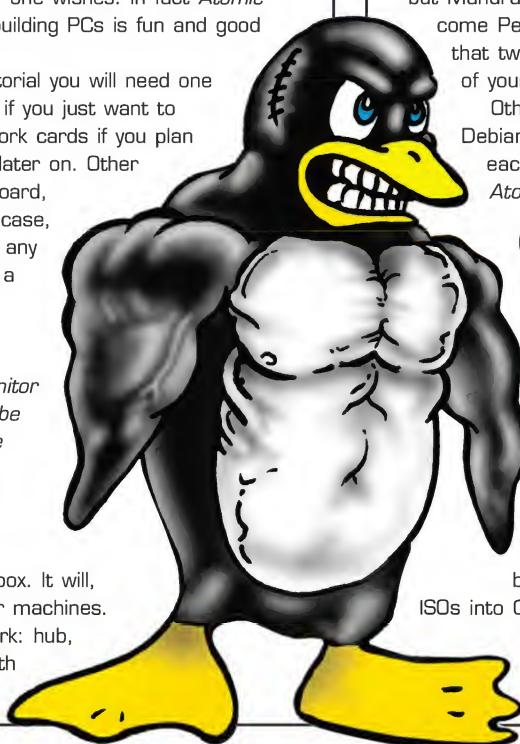
Note: one may build a PC if one wishes. In fact *Atomic* recommends this heartily, as building PCs is fun and good for the soul.

For the purposes of this tutorial you will need one network card at the very least if you just want to build a file server, or two network cards if you plan to create an Internet gateway later on. Other handy parts include a motherboard, CPU, RAM, hard drives, PSU, case, power and network leads. Use any i586 (or clone) with 32MB as a minimum, and the more the merrier of course.

Uber note: You won't need a spare keyboard, mouse or monitor after installation. The box can be remotely administered over the network, all it will require is a power lead and network cable.

One(1) network, with hub

We're going to build a server box. It will, ideally, serve things – like other machines. This normally requires a network: hub, cables, and other machines with network cards.



A single(1) distribution of Linux

Otherwise known as 'broadband', 'a friend with broadband' or 'a place with broadband that burns downloaded Linux ISOs'. If you're feeling really adventurous you could go outside into RealLife™ and buy a distribution off the shelf.

Willingness to learn(lots)

Linux is not Windows. Windows is not Linux. Don't expect them to be the same. Once upon a time you learnt Windows from the ground up, and Linux will be no different. Put in the time and you will be rewarded with snazzy cool stuff you can show off to your pals and chat up the opposite sex with. That said we're not going to go *totally* penguin-headed on you, because there's a reason you can buy Linux books.

This first part of the tutorial will arm you with a basic grounding in Linux, including some handy commands, before showing you how to set up file and print sharing so you can transform all those old hard drives into sharable space for your family/flatmates/h4x0r pals.

Choosing a distribution

For this tutorial we recommend Mandrake. Why Mandrake? To be fair there are plenty of other distributions you could use, but Mandrake is a superb learning distribution and does come Pentium-optimised across the board to satiate that tweaking / optimising / speed daemon thirst of yours.

Other mainstream distributions include RedHat, Debian and SuSE. Each is an excellent distribution and each has its relative merits. For now, trust our *Atomic* wisdom and grab a copy of Mandrake.

Getting it on

The current version at the time of writing is Mandrake 8.2. If there is a newer version available, by all means snarf it.

= Access to broadband:

<http://ftp.planetmirror.com/pub/mandrake/iso>

Grab *Mandrake82-cd1-inst.i586.iso* and *Mandrake82-cd2-ext.i586.iso*.

You only need the first two CDs for a full Mandrake install; the third CD contains programs which you most likely won't need, but feel free to grab it to explore. Turning the ISOs into CDs is just a matter of burning them with your favourite CD burning program.

= Access to broadband:

www.everythinglinux.com.au or www.lsl.com.au

Installing

When you've finished building your soon-to-be uber Linux server box of joy, hook up a keyboard, mouse and monitor and plug in the network cable. Throw in the first bootable CD and watch lots of cool text scroll by as the Linux kernel detects all your gear and discovers what sort of dodgy hardware you're running it on.

It's a well known fact that Linux will make your hardware go further, but if you're throwing together a Pentium 100, 32MB RAM system and you want to explore the GUI, don't expect miracles. We actually won't need to use a GUI on the server box, so we'll be disabling it in this tutorial to save big on resource moolah.

From here installing Mandrake Linux is a simple affair. However for the purposes of tailoring the system to be a dedicated server box with the features we have in mind for the three-part tutorial, the following guide will help:

1: Choose **Expert** for the installation class (we are Atomicans), and when prompted for the security level leave it at 'Standard'.

2: When asked to set up partitions choose to customise the layout using DiskDrake. Create two partitions: the first filling up almost the entire disk bar 256MB, and the latter occupying this 256MB remainder. DiskDrake will automatically default the first partition to be your root/boot partition using the Ext3 journaling filesystem, and the second one the dedicated swap partition.

If you have extra hard drives, create full-disk Ext3 partitions on these and type in a 'Mount Point' for each one. It's possible to concatenate these into a single volume, but we'll save that for another time. For now use /mnt/disk2, /mnt/disk3 and so on.

3: When it comes to installing package groups *deselect* Office Workstation and Internet Station, then *select* the following: Configuration, Web/FTP, Network Computer Server and Documentation. If you're planning to follow next month's tutorial and add Internet gateway and firewall features to the machine, also select Firewall/Router. If you have *plenty* of space throw in Development.

Uber note: If you think the near 1GB required for the install is a bit much for a simple server, it is. Some dedicated Internet gateway Linux distributions come on a mere 20MB ISO – but we'll be doing much more than just forwarding packets. Mandrake's 'Expert' install class also installs more than your average bear, including both KDE and Gnome desktops, all of which we like because it gives us more to play with later on.

4: When prompted set a root (system administrator) password, and write it down! We'll make you kiss Bennett if you don't! And be sure to create at least one user account.

5: For networking, give your baby a static IP for the LAN – something like 192.168.1.1. If you've got both network cards installed give the second one an address too if you like, though we'll be configuring this in next month's tutorial.

6: For the hostname enter something cool or powerful, such as 'Gigantor'. Don't worry about DNS or gateway for now, your soon-to-be networked file server doesn't need them.

7: When Mandrake asks which services you want to start at boot, just hit OK – we'll handle this later.

8: Leave the bootloader as LILO and, when Mandrake asks if you want to start the X Window System (the Linux GUI) by default, select *NO*. This won't stop us using graphical programs over the network in later tutorials, but it prevents X from running locally on this machine – a waste of resources for a server box.

And that would be it. Reboot and say hello to your new Linux baby!

First steps

When greeted by the friendly login prompt, login as the user you created during install.

If you're panicking at the distinct lack of graphical interfaceness, type `startx` to (surprise) start the X interface. As mentioned above it's still there to be used, just not enabled by default (and low-end hardware won't do it justice regardless).

From here on we'll use the command line (aka 'terminal'), not just because it's a core part of using Linux but because you may at times need to administer Linux this way over the network. If you've started the GUI use the KDE or Gnome menu to logout and return to the command prompt.

Before we do a little exploring it's time for the quickest Linux directory and command summary known to humankind. If you know anything about DOS, or are old enough to remember it, the Linux command line is very similar. Don't be shy now – it's just like using a GUI, only with a keyboard.

Everything in Linux exists in a hierarchical file structure: not just files and directories, but devices such as hard drives and sound cards, network connections, and even (as we shall see in a moment) the realtime state of the machine. This may seem odd, but it's an extremely powerful way of running a system. For example, a shared network filesystem is simply 'mounted' onto your local filesystem, and copying files between the remote drive and local drive is just a simple matter of copying files between two directories.

Core directories

/	The 'root' directory. Nought above it, and all else below it.
/proc	The virtual process directory, more on this below.
/root	The 'root' user (system administrator's) home directory.
/boot	Where the Linux kernel is stored.
/home	Where normal users can store their files.
/bin	Where binary (executable files) are stored.
/sbin	Where system (root user only) binaries are stored.
/lib	Where library files (similar to .DLLs in Windows) are stored.
/var	Where programs can store their (variable) information.
/usr	Where user-installed programs can be found.
/dev	Where links to devices can be found.
/mnt	Where local and remote filesystems are often mounted.
/etc	Where configuration files for the system are stored.

The naming scheme is global, so you will always find binary files in a 'bin' directory for example.

Basic commands

cd	Change directory
cat	ConCATenate (view) a file
cp	Copy file(s)
rm	Remove stuff
ls	List directories
ps	List running processes
kill	Kill running processes
exit	Exit a command-line shell
TAB	The wonder key



The screenshot shows a Telnet session on port 192.168.1.2. The user is connected to a Mandrake Linux system named 'Martigen'. The session displays the output of the 'cat /proc/cpuinfo' command, which provides detailed information about the CPU, including its model (AMD Athlon(tm) Processor), stepping (2), and frequency (700.032 MHz). It also shows cache sizes (256 KB), various bug fix flags (fdt_bug, hlt_bug, f00f_bug, coma_bug, fpu, fpu_exception, cpuid_level, up), and flags (fpu, vme, de, pse, tsc, msr, pae, mce, cx8, apic, sep, mtrr, pge, mca, cmov, bogonips). The session then shows the output of the 'up' command, which displays the system's uptime (11:22am up 48 days, 6:55B, 1 user, load average: 0.99, 0.97, 0.99). Finally, the user types 'exit' to log out.

ABOVE: Our Athlon based uber Linux box, up 48 days since it was built!

'...use these basic commands to explore... but don't experiment with rm logged in as root – you could inadvertently fux your system.'

Uber note: The distinctive difference between how Windows programs and Linux programs are installed is that in Windows all the files that belong to a program will go in a single directory (generally, unless it includes DLLs). Under Linux executables will go into a 'bin' dir, library files to a 'lib' dir, help files to the 'man' (manual) dir and so on. Package management tools allow you to easily handle installation/uninstallation across these structures. With this system you always know where to find a file.

You can use these basic commands to explore your system. They are all self-explanatory, but don't experiment with `rm` logged in as root – you could inadvertently fux your system.

The TAB key requires a little explanation. By pressing TAB whenever you are typing a command Linux will try and complete the command, directory name, or file name of whatever you are typing based on your current location. For example try `cd /p(TAB)` and you'll see '/proc' complete for you. Press Enter to change to the /proc directory.

While we're here in /proc, and because we love system stats, let's see what we can find.

Exploring proc

The /proc directory is a great place to find out about your system and the state of Linux. In essence /proc is a virtual directory that doesn't actually exist on the hard drive (just to confuse things for you). Think of it like a realtime system information and tweak service. To see a full list of what's available type `ls`. Note the 'blue' names are directories. Try this:

`cat /proc/cpuinfo`

Neat, eh? Now explore a little: you'll find memory, IDE, PCI, AGP, IRQ, network, filesystem, graphic, and much more in /proc. Just use `ls`, `cd` and `cat` to explore the files. Do **NOT**, however, `cat /kcore` – this file represents the entirety of your system's memory in realtime, and you'll end up with half a gig of binary gibberish dumped to your screen. 'Course, if you *like* that sort of thing... .

Now let's go root to see the messages the kernel spewed out during boot:

`su`

The substitute user command will default to root if no user is specified. Type in the root password and then run:

`dmesg |more`

And you'll be sure to learn something new about your PC. Some of you DOS-savvy types will recognise the pipe symbol '| in the command above, which is used to direct output, and the `more` program used to page output one screen at a time.

Commands, like any other programs, can take a variety of switches and be combined (as above) to modify their behaviour. To find out what a command does and its applicable switches, use the manual command thusly: `man ps`.

While we're logged in as root it's time to give you a taste of installing software under Mandrake.

Telnet

Windows comes with a telnet client but before we can telnet into the Linux box we need to install the telnet server. This isn't installed by default because, frankly, telnet is not secure. For a files server on a LAN this isn't an issue, for a gateway it is (and we'll cover this next month). Throw in CD2 and run:

```
cd /mnt
mount cdrom
rpm -ivh cd(TAB)/M(TAB)/R(TAB)/telnet(TAB)
```

The TAB key can be rather handy as you can see. The `mount` command slots the CD into the local filesystem, and the `rpm` program is Mandrake's package management tool. The '`ivh`' switch is for (i)nstall, (v)erbose, (h)ash status bar. Run `eject cdrom` when you're done.

The telnet service will be set to run at bootup automatically. We can check this and, while we're at it, disable a bunch of unnecessary services to free up resources by using Mandrake's service configuration tool:

`drakxservices`

Disable the following: alsa, fam, gpm, httpd, internet, ipchains, iptables, ipvsadm, medusa, netfs, nfs, nfslock, portmap, prelude, sound, squid, and usb. Some of these we'll get around to using in next month's tutorial. Note that FTP is enabled if you need it.

And now, friends, it's time to go remote.

We don't need no stinkin' screen!

Linux was designed from the ground up to be a multitasking, multi-user, networked operating system. Anything you can do sitting in front of a Linux box you can do remotely over a network. From changing your email settings via a simple command shell through to full blown remote desktops via the X Window system and Secure Shell (SSH) – it's all possible.

```
cd /home
mkdir storage
chown nobody:nogroup storage
```

Initially the 'storage' directory we make is only accessible by the user that created it (in this case, root). To make it publicly accessible we simply use `chown` (change ownership) to make it unowned, accessible by all. Run `ls -la` to see your work.

Back in your browser type in `/home/storage` for the path. Enter a comment if you want, like: 'Mmm space!' and click Save.

If you have more drives and gave them mount points during install (such as `/mnt/disk2`), `cd` to those drives now, create a directory to share as above, and then create Samba shares for these as well.

4: Click on the name of your new share(s) and then click on 'Security and Access control'. Select Writeable and then set Guest Access to 'Yes', click Save.

**'Back in your browser type in `/home/storage` for the path.
Enter a comment if you want, like: "Mmm space!" and click Save.'**

Chances are you'll want to stick the file server in an out-of-the-way place and just leave it on 24/7 (especially if you plan to make it a gateway). Keyboards, mice and monitors are unwieldy and bulky when it comes to jamming a box in a corner – so disconnect them! Assuming you can `ping` the LAN, all you need to hook up for your baby is power and a network cable.

Uber note: Some motherboard BIOSes don't like it if a keyboard isn't connected and won't continue to boot, while others allow you to disable this feature.

There are as many ways to administer a Linux system as there are distributions. You can do it through a terminal, graphical program, Web browser, locally or from anywhere in the world. We'll opt for the browser method as this allows us to administer the box over the network in Windows with ease.

Welcome to Webmin

The Webmin service is already running by default. Head on over to your Windows box, fire up your favourite browser, and point it to: `https://[Linux box IP]:10000`

Note the use of 'https', secure HTTP. Accept the certificate and login as root. There's plenty to explore but for now we'll set up file sharing:

1: Head on over to Servers → Samba Windows File Sharing. Samba is the Linux implementation of Microsoft's SMB network protocol.

2: Click on Windows Networking and next to Workgroup type in the workgroup name you use for your LAN. A little further down set Security to 'Share level'. Click 'Return to share list'.

3: Under the list of shares click 'Create a new file share' and type in a name for the share, then under Directory type in the full path of the directory you want to share. Hang about: we haven't created one yet have we? Time for some telnet goodness. Open up a DOS command prompt and run: `telnet [IP address]`. Login as your user account (you can't login as root for obvious reasons), `su` to root, and type the following:



ABOVE: Webmin with the MSC theme.

5: Return to the share list and the punch 'Restart Samba servers'. Your new shares should now be visible on the network! To Windows they'll appear as just another Windows machine. If you like you can also share printers using Samba, directing Windows machines to use the shared network printer.

Conclusion

You'll find lots to explore with Webmin, but do more looking than touching while logged in as root. If you need to shut down your machine you can do so from within Webmin via System → Bootup and Shutdown. You can, of course, do it from a terminal as well with the following command: `shutdown -h now/F`.

Next month: how to turn your humble file server into a slick Internet gateway box with a rock solid firewall and bandwidth boosting proxy cache.

FREES'R'US

ATI RADEON 9000

Now that NVIDIA is going the way of 3dfx, it's time to jump on the bandwagon of the new NVIDIA – ATI. The new RADEON 9000 is like the TNT2 Ultra, if the GeForce4 was a Voodoo Banshee and Doom III was Doom II. Clearly, ATI has made its intentions clear, with global domination its aim (if 'global' means a superior video chipset).

You too can jump on board the winner's chip-ship, by entering and hopefully winning this competition. Even if you lose, you can buy one of these cards, or any other from ATI's new range, which we think, speaking on behalf of ATI, would please the company quite a lot.

Mad props to BlueChip InfoTech (www.servex.com.au) for this prize.

Q: Who invented the electrically heated toilet seat?

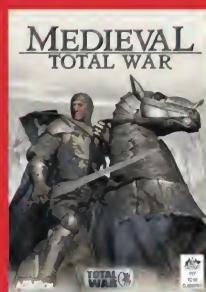


Getting Medieval

Activision's delightful new game about battlefield mutilation, decapitation, dismemberment and sucking chest wounds – Medieval: Total War – is about to hit the street. Be prepared with a copy for yourself. This sequel to EA's Shogun: Total War dispenses with Samurai honour, instead grunt-rushing your willing recruits with a cart load of drunken peasants with dirty spears. Fantastic! With huge numbers of units on screen at a time, this is one strategy game that'll make your 90 unit points in Warcraft III look paltry.

Activision has given us three copies of the game, along with three posters, so you can alternate your gaze between an artist rendition of marauding hordes up on your wall, and a 3D animator's best attempt, on your screen.

Q: What medieval ailment did Cocks Stones relieve, and what's the main ingredient?



JNC SSF-886B

The JNC SSF-886B sounds more like the name for a new US Hunter Killer Submarine than that of a sexy MP3 player. And what an attractive MP3 player it is; in fact, we got so worked up over this ultra-slim gadget that we just had to award it the coveted *Atomic* Hot Award. So you guys should be pretty stoked to learn that we've got one of these players to give away this month. If you're still stuck in the world of CDs or, heaven forbid, cassettes, now is your chance to move a rung up the evolutionary ladder and join the rest of us in MP3 land.

Proceed to thank Datum Tech Pty Ltd (www.jnc-digital.com.au, (02) 9264 8677) right about... now!

Q: What unusual item does Blink 182 request as part of the band's backstage dressing room requirements?



Dacal CD Library

When Fonzie wanted a certain disc to play on the Jukebox, he'd thump the thing and it would play. Magic, and instantly too, which indicates that modern pub jukebox loading times have, for some reason, slowed dramatically. Recently this ridiculous backwards trend of reverse technical evolution has turned 360 degrees and is headed back in the right direction. Take a look at page 59 of *Atomic* 19 and have a read of our Dacal CD Library. This ugly yet amazingly useful device stores and delivers the CD you want, when you want it. With but a mouse click too, and nary a Fonzie thump in sight. We asked www.auspcmarket.com.au – (02) 9817 2899 – for one to give away and Aus PC Market agreed, because that company is so super nice.

Q: What is the full name of Fonzie's stunt driving girlfriend and what was her band's name?



Email entries to win@atomicmpc.com.au or post them to: Atomic, PO Box 275, Beaconsfield NSW 2014. Please send a separate entry for each competition. Please ensure the competition name is the subject of the email, or is displayed clearly on the front of the envelope. The closing date for entries is 18 September 2002. Winners will be announced in *Atomic* 22.

Atomic 18 winners: Duron 1.3: Q. What was the name of the special combat variant of Space 1999's Eagle? A. Mark IX Hawk. P. Prendergast, Mepunga East VIC. mStation Car Jukebox: Q. In House music history, what was the first ever Acid track called? A. 'Acid Trax' by Phuture. B. Reynolds, Marrickville NSW. Baybus kit: Q. What's the main effect that allows flight? A. Bernoulli effect. N. Abolins, Leabrook SA. Tactical Ops: Q. Who banged his shoe loudly on the podium during an address to the entire United Nations General Assembly? A. Nikita Sergeevic Khrushchev. R. Fischer, Marangaroo WA; T. Stephens, Beaumaris VIC; B. Eales, Bulimba QLD; L. Baldan, Rowville VIC; R. Lent, Umina NSW; A. Molyneux, Onkaparinga Hills SA.

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Speak and ye shall be heard

Speak and ye shall be heard! Perhaps. Maybe. Ah hell, just send us the damn letters already.

This month, we have another fine batch for your enjoyment. LOTM and POTM score a copy of Warcraft III Collectors' Edition, thanks to Vivendi Universal and Blizzard. Wicked.



LOTM: Evil Admin

Show us a poet and we'll say 'go it'. Like bananas and cream, it can make you dream. This month Kai, being a great guy, gave us this gem, writ with his pen. Unless Kai's a chick, but would still be our pick.

flicker! flicker! little modem light!
see you shine, so neat, so bright!
I wonder why you flicker so?
is it cos you're 'effing slow?

transmitting packets through the night...
slinging porno byte by byte...
watch the monitor's pink glow...
as the image starts to grow...

ping it! ping it! watch it die!
hear the hard disk crash and fry!
see the user weep and cry,
reboot again and wonder why?

Kai

Intel ownz j00 all

I was reading *Atomic* issue 18 and was especially interested in your review of *Soldier of Fortune II*.

Your article stated the following: 'To run this game at maximum detail you're going to need the modern day equivalent of HAL9000, because even on an Athlon XP 2200+, GeForce4 Ti4400, 512MB DDR-RAM, a couple of scenes dropped to below 20fps.'

POTM: Code layout

POTM goes to forum *Hero Protozone*, for insights regarding proper commenting and layout of code. While many gave valuable contributions on this topic, *Protozone* came up with an absolute gem. No-one likes debugging code written by someone else, but if every programmer follows good layout and commenting practices, we'll never again be forced to hunt bugs in spaghetti.

www.atomicmpc.com.au/forum.asp?cat=pr&top=58142

One thing I used to do was comment each individual line of code, for example:

int x = 10; // Set x to 10

This is not good. It states the obvious and doesn't help six months down the track when you need to look back on code. Any idiot can see that the line is setting x to 10, and no-one needs a comment to tell them that. Instead, try commenting blocks of code that do something useful. For example:

```
// Find largest value of x
largest = -999;
for(int index = 0; index < 10; index++)
{
    if(my_array[index] > largest)
    {
        largest = my_array[index];
    }
}
```

Protozone

Well, I hate to say this, but this obviously proves that the Intel Pentium 4 2.0GHz Socket 478 CPU outguns the competition. I ran SOFII on the following system configuration: Intel Pentium 4 2.0GHz Socket 478 CPU; ASUS P4B266 motherboard; 512MB DDR-RAM; ASUS GeForce4 Ti4400 (1024 x 768 x 32); and Microsoft Windows XP Pro. There is not one single hint of frame rate drop on my system, and in some cases it simply runs too fast.

I have every single graphical feature known to man turned up to max, with no overclocking required. This goes to prove that the Intel processor and the ASUS GeForce4 work hand-in-hand to produce the fastest running game in history.

Rodney Mayhew

Bennett: Strange you should say that Rodney, as we'd been led to believe that large textures were the reason for the slowdowns, pointing to the video card as

the likely bottleneck. That seems to be the main consensus on the official SOFI forums, anyway. However, if it was indeed CPU bottlenecked, it's not surprising that a P4 runs it faster. The Q3:A engine usually runs faster on an Intel CPU than AMD's offerings. And by the way, don't EVER say a game is running too fast! Blasphemer.

Edumacation and nonlearning

I've been an avid reader of your most informative magazine since its inception. What I have seen through each issue is the gradual and dynamic evolution of technology. The reviews/facts/statistics and comparisons are, overall, up to date with today's standards – unlike my University's teachings.

I'm a University student struggling to justify why I am doing an Info Tech degree, especially as the concepts we're learning are so outdated and irrelevant in today's industry. Furthermore, the quality of education within my institution is somewhat non-standardised. Let me give you an example: the tutorials and practicals for my computer programming subject are all run by honours students – with no real concern or teaching ability – who get paid by the hour. Many people have argued that we should do the learning ourselves, but I ask them this: 'Had this been a medical subject in which we had to perform a triple-quad heart bypass, would we be taught by an honours student? I think not.'

The IT educational sector should take a good hard look at itself in order to bring forth not only good teachers but also good students. IT tertiary education is not only about research grants: students should have their position in lecturers' priorities. AITO

Fsck Linux, I want PS2 Unix!

While surfing around the PS2 site I came across the Linux kit for PS2 kit. I was delighted with this and wanted to purchase one immediately, but was set back by the \$500 price tag. Still, I started saving up for the Linux kit while dreaming of the absolute power of running Linux on my PS2. Then one unfortunate day my dreams were shattered by my brother, who told me the PS2 running Linux would run like a beefed up 286. Disheartened, I immediately used the money I'd saved to buy Final Fantasy X.

After a while, I then began thinking of what would happen if, just maybe, I created my own upgrade kit using Unix instead of Linux. It would include all the best PC components (good and cheap), and an *Atomic* toolkit along with an external star screwdriver to open the PS2

and fiddle around. This kit would be extremely expensive and cost about the same price as a good work computer. All I need to do now is sell my idea to Sony. Yours in hope,
Young Squire

Good idea Mr Squire, we've got the Linux PS2 jobbie reviewed on page 54 of this Atomic, and if you manage to get Sony inside we'll review your box too :)

Size doesn't matter, really

I would like to comment on *Noise elimination*. I'd be surprised if cavitation was that big a factor: it's prevalent in marine applications but water is incompressible and very different.

Cavitation creates a vacuous section in the flow immediately behind the blade. The pressures are so altered that the water is displaced by air that is literally sucked out of the fluid, creating an imbalance, reducing effective blade area, and therefore thrust and drive.

The most efficient fans always seem to have seven or nine blades. The hub can be as much as 40% of the diameter of the fan. A domed spinner and a bell shaped mouth are advantageous in smoothing out the inflow, and can add as much as 5-7% to the flow. The curve of the inlet radius of the mouth should be between 0.05 and 0.15 times the radius of the fan.

The exit area ought to be about the same as the fan area and that should conform through any cross section. To differ by more than 5% will degrade performance. Big trouble for the idea that whacking on a larger diameter fan and necking it down will somehow give a performance increase, so forget getting 100% of the stated CFM.

The clearances between the blades and the ducting are critical and ought not to exceed 15 thousandths of an inch. Modern blades are now more often swept back in a scimitar shape, but this is quite unnecessary with tip speeds less than mach 0.6. Below this it is more important how a form leaves the air than how it might be seen to cut through it – placing the importance of the trailing edge of the fan. Notice how many aircraft show finer sections aft than at the nose.

You might consider replacing the axial style compressor with a centrifugal unit, which looks like one half of a turbocharger; the diameter would exceed that of the axial it replaces. The first jets followed this design as they are easier to make, and hold better efficiencies in crude forms. Axials are more efficient within a narrow band but much less so off the peak.

Centrifugals contain much of the noise within the duct, although ducting adds friction and reduces performance, and the bulk may present problems in fitting it in the box. You could suck air from outside as this would be cooler by some degrees. You could also try to turn an axial fan around so that it sucks air through the heat sink. Less efficient in terms of flow but it avoids adding heat created by the fan and motor to the temperature of the air until it is exiting the fan where it is expanding anyway. You might then push it out of the box with smooth ducting and eliminate recirculating contained heat. The fan stators, which support the motor to the fan duct, could use attention, being crude aerodynamically inadequate shapes.

When purchasing a fan, you might consider the parameters provided above and take into account the wattage of the unit. The fan that uses the most power will likely pump the most air and this should correlate with the advised CFM.

Rob Scott

Pasting an *Atomic* overclock

After reading one of your answers to I/O I said to myself: 'What! That's not an *Atomic* answer!' I am of course referring to the overclocking query raised by Alex in *Atomic issue 18, page 83*. He states that he has an Athlon 900 on a 71XE4 gigabyte motherboard, and would like to overclock it. Moreover, *Atomic* said he could not do much with it at all. On the contrary, he can do a lot: he can get it to run stable at 1100MHz. I recently helped my friend do this on his PC: he also had an Athlon 900 and a motherboard that did not support multiplier or voltage increments.

We joined L1, L6 and L7 and cut L4 bridge on the CPU to achieve a maximum of 11X on the multiplier and 1.85V on the voltage. All was good but his HSF was not up to scratch. So to keep the hot Athlon cool, we purchased the Zalman CNPS6000CU HSF. It not only kept the CPU cool, it did it quietly, unlike some 6000rpm HSFs. I just needed a pencil, Dremel, new HSF and some Arctic Silver.

Joining the L6 and L1 bridges was easy using a standard HB pencil. Next came the hardest part: we had to cut L4 bridges using the Dremel. Luckily it did a very good job. After that, we rejoined the L4 to 11x setting and we were flying. I know it's extreme but that's what you guys are. This site shows you all the default settings for the Athlon and Duron CPUs: www.weethet.nl/english/overclock_duron.asp #bridges (oh, and the 1.850V setting on the link is incorrect).

Shanib Rahman.



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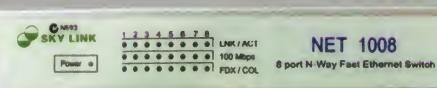
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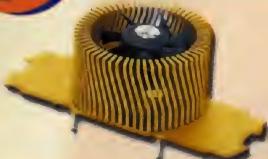
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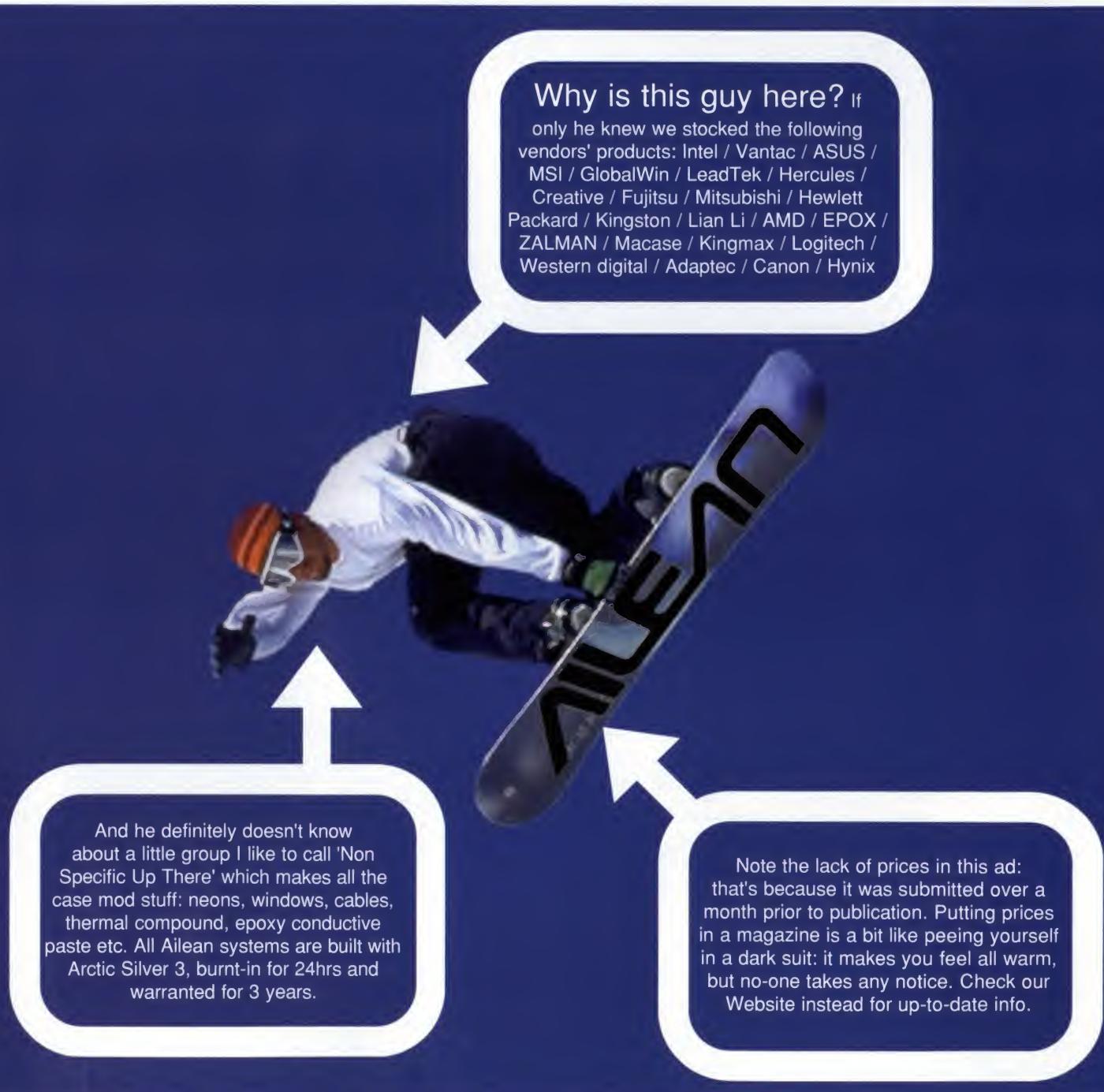
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And he definitely doesn't know about a little group I like to call 'Non Specific Up There' which makes all the case mod stuff: neons, windows, cables, thermal compound, epoxy conductive paste etc. All Ailean systems are built with Arctic Silver 3, burnt-in for 24hrs and warranted for 3 years.

Note the lack of prices in this ad: that's because it was submitted over a month prior to publication. Putting prices in a magazine is a bit like peeing yourself in a dark suit: it makes you feel all warm, but no-one takes any notice. Check our Website instead for up-to-date info.

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A little light work

As I flicked the wall switch there was a crackle – like water hitting a hot frypan – then a buzz that got steadily louder. At first I was confused: 'Well that's never happened before,' and as the smell of burnt plastic filled the room, I twigged that something was very, very wrong.

You know when something bad happens and everything slows down? Like when you press 'Y' instead of 'N' to format drive C? Well this was just like that. As smoke billowed from the vents, time slowed to a crawl. I swear if someone had fired bullets at me I'd be able to pluck them from the air. Fortunately no one did, so I used my new skill to do the next best thing: turn off the switch.

She-who-accounts-for-my-stupidity was sitting nearby, coincidentally holding a fire extinguisher (she'd seen me operate on my PC before). She looked at me expectantly, not knowing how I'd react. As I usually do when I'm in shock, I stated the obvious: 'That didn't sound good.' She nodded very slowly, wondering if her next move should be towards me, the smoking box on the desk, or the grief counsellor's phone number.

'Maybe it's not so bad,' I consoled, more for my sake than hers. Cautiously... I flicked the wall switch back on. No

more smoke – good. Then I hit the power switch. No more little lights – bad.

I'd just toasted one of my closest friends. Oh. No.

At first there was denial ('I don't believe this'), then anger ('I don't f***ing believe this'), then hope ('maybe I can retrieve this?'). After that came the really hard part: trying to work out what I'd done and how to fix it.

It turns out that computers are like girlfriends: when they break-up, they either take some things with them, or they destroy everything you own. Me, I got the bunny boiler. The one that annihilates all your favourite stuff, then gives you a nasty shock if you ever try to touch her again.

Unfortunately, I didn't know this at the time. False hope led me to believe it was just the power supply. Hence, I visited the local swap meet, bought a new 400 watt PS with dual fan (nice!), and plugged it in. Result: no little lights.

Next thought: I must've also cooked the motherboard (damn sensitive things they are!).

So, like every good Atomican, I trawled previous issues of the mag and visited a few of the local specialist stores. I found a brilliant new motherboard with Pentium4 533FSB support and USB2 (only after purchase

did I discover the board uses the latest PC1066 RDRAM – so I spent the rest of the weekend recovering from price shock). On Sunday night I installed the new motherboard.

Result: still no little lights.

At this point any optimism I had began to float out the window like so much magic smoke.

She-who-can-tell-when-to-leave knew things had gotten bad when I turned off Buffy in a bathrobe to interrogate my hard drive. No matter what I tried (master, slave, leather, chains) my C drive just wouldn't spin. I would have been satisfied with just 33rpm, but it refused to play. My life, as I'd known it, was gone.

So now I'm typing this article on a completely new machine, with striped RAID IDE133 drives, 48 speed CD-RW and enough RDRAM to fund Taiwan's space program. Do I miss my old life? Sure, it's going to be damn hard finding all that free porn again, and no one will be getting birthday cards anytime soon. But I keep telling myself it worked out okay, now that I can open Photoshop in 0.73 seconds and my Office assistant moves like he's on speed.

If only I could find out how to make those damn little lights go on... .

John Simpson



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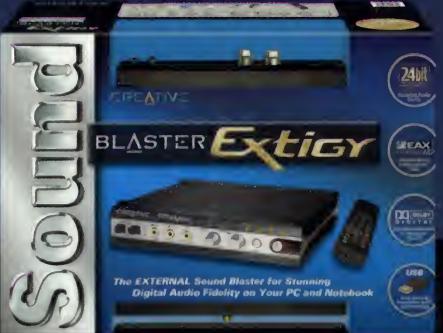
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